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THE FUNCTION AND EFFICIENCY OF THE AGRICULTURAL COLLEGE

IT would be an indication of ingratitude and inappreciation if I failed to acknowledge at this time the great honor of being elected to preside over your deliberations, an honor commensurate with the distinguished history and eminent usefulness of this association. Because it has been my good fortune to attend these meetings from their very beginning, in addressing you on this occasion I can not be accused of speaking without knowledge and understanding if at first I refer in the spirit of congratulation to the benefits of this organization, both for those of us who have participated in its deliberations and for the institutions which it represents.

Not the least important outcome of these assemblages are the personal relations that have been established. The hand clasp that has spanned a continent has not only made possible the formation of friendships that have greatly enriched our lives, but thereby has come a sympathetic touch of laborers in the same field so essential to unity of purpose and understanding. We would all feel impoverished, personally and officially, if there were withdrawn from the sum of our life experiences the beneficent results of the intercourse that these meetings have afforded.

Because we are friends as well as coworkers, we keenly feel the absence from our midst of those who have passed out of life's activities. Two of the best beloved of our long-time associates have entered into their final rest during the year that has passed. For many years these gather-

ings were favored by the gentle and refined presence of Matthew H. Buckham, who through a long life of activity as an educator exhibited the qualities of a scholar and a gentleman. May many rise up with a similar type of mind and character to mold the intellect and purposes of coming generations! We shall not forget the kindly spirit, the manly attributes, the singleness of purpose and the efficient service of Edward B. Voorhees, whose life and activities were on a plane so high that they presented an inspiring example of useful living. The number remaining of those who aided in founding and building these new educational agencies and who are still in active service is small, and these pioneers in an undeveloped field can but feel that they are transferring to "other men and other minds" the abundant fruit of their labors.

Again, this association has been an active and most influential agency in augmenting the resources of the institutions from which you come, and in developing and unifying their administrative and pedagogical methods. Through your accredited representatives an influence, national in scope, has been focused upon legislation. The enlarged financial support of the colleges and stations by the federal government could hardly have been secured without your united effort, directed along an authorized channel. You must also recognize very clearly that your annual discussions have been helpful, even essential, to the wise solution of administrative and educational problems. Probably no other influence has been more potent in hastening and shaping the far-reaching readjustment that has been effected during the past few decades in the aims and methods of education, even in our secondary schools, than has the example and propaganda of the institutions arising from the first Morrill act, an influence to which your deliberations have served to give form and purpose.

But the main reason for extending congratulations to you at this time is the status and beneficent results of the activities here represented. It would be easy to show the marvelous growth of the equipment and work of the land-grant colleges and agricultural experiment stations by the use of statistics that are almost startling in their proportions. I shall not resort to this method, however, for you know the facts, and besides, the prominent display of such large figures savors of showy parade or of vainglorious pride. It is enough to say that as a whole these wards of the nation and states are liberally equipped as to buildings, apparatus and funds, with a disposition on the part of the state governments to provide for increasing demands in these directions; students are not lacking, practise both in agriculture and engineering is giving respectful attention to your utterances; all this indeed because after nearly five decades of strenuous and almost heart-breaking struggle, whatever have been your mistakes, you have demonstrated your right to exist and thereby have won public confidence. The colleges and stations for whose upbuilding you have labored hard and loyally are now public utilities of great importance. They are an intelligent and directive force in the conservation of our resources, both social and material. In brief, these institutions have come to be a national asset of great and permanent value.

But now that the hardships and discouragements incident to the establishment of the new and the untried are past and public confidence is won, now that you are reasonably well equipped and have the plastic minds of thousands of young men

and women with which to work your will, the time has come to ask this question: Are these agencies, established and maintained by public funds, doing work of a kind and in a manner, under the conditions which have developed, that is calculated to most fully promote public welfare? No one will deny the assertion, I am sure, that the colleges were brought into existence, not for the purpose of providing a fraction of one per cent. of our young men and women with a college education as an individual favor, but to be constructive and conserving factors in building and maintaining a strong nation. "The community has come to be convinced that education is the most competent means for the preservation and enrichment of itself." With this end in view, is their work wisely planned and directed?

A consideration of this comprehensive question requires that we bring to mind the directions along which the colleges and stations exert their influence in the exercise of their proper functions. These directions are mainly three:

1. The public relations of educational agencies.

2. The enlargement of the body of knowledge.

3. The development of the vocational and social efficiency of the individual.

It is my purpose to direct your attention chiefly to questions involved in the college training of young men and women and the development of knowledge, but I ask your indulgence while I briefly refer to the first phase of influence which I have mentioned:

As to the influence of the land-grant legislation and its results upon the public or governmental relations of educational agencies, there can be no doubt that one of the consequences of this legislation is a strong movement toward the injection of federal aid, and the federal control necessarily, accompanying the expenditure of federal money, into secondary education that so far has been exclusively supported and controlled by the states. The concrete expression of this movement is the introduction into congress of bills providing for the annual expenditure of vast sums of federal money in aid of normal schools and high schools in the various states. The policy proposed, if made effective, would have far-reaching results and for this reason it should be considered by this body in the spirit of wise statesmanship with reference to ultimate results rather than on the basis of any immediate financial advantage that might accrue to states or institutions.

It is well for us to keep in mind this law so well formulated by an educator of long experience, "that the efficiency of public education becomes the greater as the responsibility for carrying it forward is more directly and immediately felt." This admirable expression of a sound principle may be supplemented by the statement that an efficient system of public education can not be imposed upon a community by aid from without, but must be gradually developed from within.

Moreover, the broadcast precipitous distribution of public funds into localities where there does not exist the understanding and preparation necessary to their wise expenditure is sure to result in lamentable waste. This would be a less regrettable result, however, than the influence of outside aid upon the spirit of initiative and self-dependence of the people, in the absence of which no progress is made in any enterprise whatever. The school-district system once widely in vogue in the eastern states, where each political unit was practically a pure democracy, while expensive, possessed certain advantages of simplicity

and directness because of the close relation of the citizen to the school. It was a system that gave large latitude to the individual development of boys and girls and was far removed from the mechanisms of highly concentrated systems that are inelastic and attempt to force square boys and girls through round holes. While the old system would not meet existing conditions, which, for reasons of economy, require a closer organization and a fuller concentration of authority, we should avoid, so far as possible, the dangers of bureaucracy in school administration that are by no means unreal. The injection of federal aid and authority into local educational affairs could but increase the dangers to educational freedom that always attend a highly centralized administration; and, above all other considerations in importance, such a policy is in the direction of removing the citizen too far from his direct responsibility, even through taxation, for the maintenance of local institutions. The exercise of citizenship, involving as it should a discussion of public matters and a sacrifice of time and money, has great training value and is an essential means of attaining the civic efficiency necessary to our form of government. Have we any reason to doubt that the states will provide for advances in secondary education as rapidly as public sentiment, available pedagogical tools and opportunity will justify new movements? The progress already made in several states indicates that we have not.

There are those who declare that the advance of nationalism, even in the control of education, is irresistible. It is encouraging to note that there are already signs of an action against this movement. Whatever comes to pass, we should be warned that any readjustment of the relations of government to education which does not fully preserve the autonomy of the states, and to a reasonable degree, of localities within the states, in the administration of educational matters, would be repugnant to the spirit of our institutions, and a revolutionary and dangerous innovation.

I shall introduce the other phases of this discussion by the assertion that the chief and absorbing aim of the college, whether it be subsidized by private endowment or by public funds, should be the training of young men and women in a manner and to a degree that is consistent with well-recognized college standards. This statement, regarded by many as expressing an obvious truth, is given prominence in this connection not because there is any ambiguity in the language of the first Morrill act, which specifies very clearly the function of the proposed institutions, but because in recent years these colleges are moving with accelerated momentum towards agricultural activities, costly in time and money, that have only a remote relation to the training of their students. I refer to public addresses, farmers' institutes, reading courses, demonstration work, railroad-train instruction, fair exhibits, secondary education and similar efforts that just now seem to be increasing rapidly in volume and in their demands.

Because many of these activities are more or less spectacular and are popular in character, they certainly attract attention and stimulate interest both in the agencies which participate in them and in the knowledge which it is sought to impart. For these reasons they are very useful. Doubtless many of us upon whom is laid the burden of administering the affairs of the colleges and stations and of securing the funds necessary for their development and maintenance regard extension work of

various kinds not only as rendering a real public service, but as an efficient means of securing the public favor that insures generous support. It would be an interesting problem, psychological, ethical or otherwise, to determine in what proportions altruism and expediency enter into the motives that lie behind some of our agricultural propaganda.

But, setting aside the question of motives, there is every justification for declaring that in so far as these popular efforts, and secondary education within the college, minimize academic efficiency through the diversion or limitation of funds, through their absorption of the time and energy of teachers or through their reaction upon the atmosphere of the college and its standards of instruction, in so far the lesser is usurping the greater. It is fully recognized that this assertion is antagonistic to the view that extension work is a function of the agricultural college coordinate with, and of equal importance with, the training of young men and women, to be maintained on an equal footing as to development and permanence, and it is so meant. It may further be said that because of the strong trend towards the popularization of agricultural knowledge both within the college and station and without, because of the sweep and strength of the agricultural extension movement which is taking such diverse forms and is so largely occupying the thought and energy of college and station leaders, there has never been a more critical period in the life of the colleges and stations or a time in which their efficiency for the accomplishment of their primal and fundamental purpose should be more carefully guarded.

The gravity of the situation is augmented by the fact that the agricultural and business interests of the country, alive to the value of our worth, are now proposing to us what we shall do and are urging upon us not only efforts of our own, but our active support of new efforts that are outside our province, but to which we are expected to sustain relations of advice and aid. These suggestions, which sometimes are almost equivalent to demands, are certainly made in the spirit of goodwill and helpfulness and are always worthy of our most respectful and careful consideration, but it is seriously to be doubted whether popular conceptions of the aims and methods of education and inquiry are a safe basis on which to establish the policy that shall dominate the work and influence of either the college or station.

The chief reason that will here be advanced for directing the means and energy of the land-grant colleges along the higher ranges of educational effort is that under the conditions now existing these institutions will most fully promote public welfare by devoting their resources mainly to preparing men and women for leadership. Our social and vocational future is largely a matter of leadership. He is wildly utopian who prophesies a day when all the people, or even a majority, will possess the knowledge and ability necessary to a wise discrimination in civic and economic affairs. It is equally fanciful to hope that any large proportion of actual farmers will ever be college-trained. Secondary education must serve the needs of the great majority of the occupants of the land. In the past the reaction of the agricultural college upon public welfare has been largely through men who have become investigators, teachers, publicists and managers of large agricultural enterprises rather than through the distribution of practical farmers.

What has been true of the past seems likely to be increasingly the experience of

the future, and this fact in no way minimizes the value of the college in agricultural affairs. We ignore the teachings of all human experience if we look for the time when the destinies of the nation and the interests of agriculture or of any vocation will not be safeguarded by a small minority of citizens whose training has placed them outside the domination of dangerous sentiment and ignorant prejudice and who possess that power of discrimination derived from a knowledge of fundamental principles, without which we may not expect an intelligent and judicial consideration of either vocational or public questions.

Not only are we greatly dependent upon wise leadership in both social and industrial affairs, but with the college lies the opportunity for its development. It is among the young men and women who seek the advantages of college instruction that we find those who, because of ambition and capacity, constitute material with the largest possibilities of future usefulness. If the college fails in wisely molding these plastic minds it fails to fully occupy its one great opportunity, and if, on the other hand, the training given is inadequate or unbalanced or in any way less effective than is reasonably possible, both the receptive student and the public are defrauded and suffer a loss that can scarcely be made good.

Not all college graduates will be leaders, and not all leaders will possess a college degree; but it is a fact worthy of emphasis that the opportunity of the college is with the few and not with the many. Only a very small proportion (perhaps one or two in a hundred) of any generation of men and women will come into extended contact with college life, and these few will be the medium through which the college will render its largest and most effective service. The college can never come into efficient touch with the many as it does with the few. Whatever direct influence it secures over the general public lacks concentration and continuity; in fact, is diffuse and indefinite. Experience and observation show that a discouraging proportion of the minds reached by the attempts at popular instruction are either irresponsive or incapable and the constructive value of these efforts is not to be compared with the life-long example and influence of those who are adequately trained for social and industrial leadership.

There are those, doubtless, who believe that these institutions, supported by public funds, should stand in especially close relation to the people and that in order to do the work for which they were organized they should establish a low grade of admission, occupy a secondary place in our educational scheme, adhere closely to instruction of an ultra-vocational character and engage extensively in agricultural propaganda, leaving to the older colleges and universities the severer training that is required in preparing men and women for the higher ranges of thought and activity. It is to be hoped that if we have in any measure adopted this policy we shall move away from it as rapidly as circumstances will permit. Such a policy is a practical assumption that there is no place in the agricultural field for the highest type of intellectual development and equipment, an assumption to which no well-informed student of social and economic conditions is likely to consent. If we also take into consideration the fact that the dignity and importance of agricultural opportunities receive little emphasis in those institutions where the main trend of thought and training is in other directions, we see sufficient reasons why the agricultural college should not relegate to other agencies its clearly

indicated function—the production of the leadership that is needed for advancing the interests of the farm.

And so, because of the unsatisfied demand for adequately trained teachers and investigators, because of the complex and difficult problems related to farm life that insistently face us, so many of which are unsolved, because the redirection and upbuilding of rural-life institutions need for their accomplishment the guidance of leaders of a high order of ability, and because of the greatly increasing demand for service in these several directions which is only partially met, should we not insist that the material resources and the human knowledge at the command of the agricultural college and the plans and purposes there nourished should be directed toward sound inquiry and the training of young men and women for such service as will only be rendered by the few. Until we have means beyond what can reasonably be expended in increasing the efficiency of the colleges and stations is it a wise policy to assign to other purposes funds that should be applied to securing and holding teachers and investigators of large attainments and success, those who are masters in their special fields? Agriculture needs more of such men and should be able to create for them a favorable environment for their work.

And we now come to a question towards which this discussion has been aiming from the very first. What conditions should prevail in college instruction and what results should be kept in view in the training of young men and women for vocational and social leadership?

In considering this question we may well begin by asking what qualities should be possessed by those who are to enter effectively into the service of agriculture and country life. There can be but one answer. They are the same fundamentally that are essential to efficiency and well rounded success in any calling or profession. If the teacher, the investigator, the statesman, the lawyer or the business man should possess integrity of thought and purpose, be able to reason keenly and base their reasoning on fundamental and well-grounded principles, so should those who are to assume responsibility and leadership in agricultural affairs. There is no place for loose thinking and the empiricisms of superficial knowledge in the consideration of the economic and social problems pertaining to the open country. It is hardly conceivable, either, that the college will succeed in developing in its students these necessary qualities by any educational methods essentially different from those commended by long experience. The pedagogical tools may differ from the old ones, but the ultimate result, if it is worth while, will be those attributes of mind and character that have long been recognized as the distinctive marks of strong men and women.

As preliminary to a discussion of the conditions essential to the attainment of this result, we may safely establish certain premises on which to base any contentions that may follow. These premises, conceded on every hand, are the following: first, the subject matter of the class room should be concise and severely engage the student's mind; second, the instruction given, in whatever field, should represent the latest and best conclusions; third, this instruction, if it is to secure for the graduate an advantage over the merely practical man, must give a well-grounded acquaintance with fundamental facts and principles; fourth, the college should so react upon the young men and women that come within its influence as to develop in them high ideals of living.

There are three factors that are most

intimately related to these fundamental conditions, the teacher, the curriculum and as an outgrowth of these two that somewhat intangible influence we call college atmosphere.

What about the larger of these factors, the teacher? It should be required of him as one great essential that he be a man of scholarly spirit and attainments, and being such he should have opportunity for study and reflection. Is it not time to inquire whether we do not need a renaissance of the atmosphere of scholarship in our vocational colleges, an atmosphere that must first surround the teacher, there to be breathed in by the student? Because we have been exalting the man with a so-called practical touch, possessed of the ability to edify the farming public, through a pleasing way of discussing practical subjects or who hustles about doing things, is not our vision of the scholar as an essential factor in agricultural education and inquiry somewhat obscured, and if scholarship is to be discounted in favor of qualities that make for popularity, we may well be solicitous concerning the standards and effectiveness of agricultural instruction, a statement that is equally applicable to experiment stations as instruments of research.

It is a gross error to permit a young man, or any man, to believe that success with the people in conducting agricultural propaganda, or the possession of superficially built and glibly expressed practical knowledge, unsupported by a sound scientific training, constitutes an adequate reason why he should be a member of a college faculty or a station staff. Success in the energy-consuming activities of the institute platform, the fair exhibit, the railroad train or the demonstration field is not an evidence of fitness for class room or research work. We are guilty of a false estimate of values when we place a salary premium or any other premium on success in distributing diluted information, however valuable this effort may be, as against the function and influence of the quiet and patient scholar.

If the college is to nourish the moral character of a student, the teacher must be something more than a scholar. Character will not be much influenced by directly aiming at such a result through the teaching of ethics. Much more potent will be the general tone or atmosphere of college halls, an atmosphere that emanates from the teacher. In his hands, teaching the sciences should not only promote scientific accuracy, but should nourish integrity of thought and purpose. All the exercises of the class room should be pervaded by the ethical spirit. For these reasons the standards by which a faculty is selected should include something more than the possession of good character, and the necessary professional qualifications. The human attributes of the teacher are no less important.

We may consider certain dangers to college instruction arising from extension work. This work on the part of the college teacher is a menace to his efficiency, because such activities not only use the physical energy that should be reserved for the class room, but sooner or later they minimize or destroy the habit of study and the spirit of scholarship. The man who serves for any considerable part of his time as a purveyor of popular information is almost certain not to present to his students the latest and best knowledge in the best way, or to add much to the stock of knowledge.

Another danger to the teacher from a diversion of his thought to extension work of the popular kind is that unless he possesses unusual self-discipline and control, he will carry to the class room more or less

of the loose and dilute phraseology of platform discussion and will to a greater or less extent depart from the concise and severe terminology so essential to the best training conditions.

These are most unfortunate results. We should carefully guard and cherish the intellectual impulses and equipment of the teacher and the investigator, because they are the instruments whose edge must be fine if we are to be successful in rightly fashioning the minds and hearts of young men and women and in laying open the hidden recesses of truth.

What has been said concerning the qualities of the teacher and the necessity for defending him against the invasion of outside duties applies with equal force to the investigator. The experiment stations here represented, founded as research agencies, have rendered splendid service to agriculture and are now firmly established in the confidence of the people. Nevertheless, we should not let the popularity of these institutions cloud our vision or confuse our estimate of the real character of their work. They have mightily stirred the mass of agricultural knowledge, have conducted an extensive propaganda of existing information, have recast old facts and principles into new and profitable applications and have made some explorations of real value into the unknown, all of this to the great benefit of the farmer and his business. But the period through which we have been passing can justly be characterized as much more marked for its development of agencies and for its distribution of existing information than for its permanent additions to agricultural science.

Moreover, leaving out of account the extensive dispersion of the time and energy of experiment station workers into the highways and byways of agricultural extension and considering only our attempts at investigation, it may reasonably be doubted whether, broadly speaking, our efforts of inquiry have been conducted on a plane of spirit and method as high as that reached by the investigators of an earlier period. It may be that we have lived up to our present possibilities, doubtless we have, but whether we have or not, it is certain that unless the agencies constituted for research purposes can secure and maintain larger freedom in policy and more fully break loose from the restrictions of expediency imposed by semi-political relations and by misguided demands for popular efforts on the part of supposed investigators, we shall mostly continue to halt on the outskirts of great problems whose solution would render to agriculture the highest possible service. It is gratifying to be able to believe, however, that we are on the ascending plane in the stability and effectiveness of our research efforts.

These suggestions concerning the limitation of the activities of the teacher and investigator are not intended to be arguments against the eminently useful efforts directed toward enlightening and stimulating the public mind. These efforts should continue, but it is fair to inquire whether we have not reached a point in the development of agricultural education and the demands made upon it, where the widely distributed popular instruction and secondary education of all forms should be maintained through agencies organized especially for these purposes, to which the college of agriculture should be coordinated in an advisory relation. Extension instruction and secondary education if they are to work out the largest values, must be widely available and stimulate local initiative and activity. The college may well be a source of advice, and, when means are abundant through a corps of experts who shall be independent of other duties, it may aid in

giving the needed accuracy and direction to the knowledge that it is sought to impart. But such aid should serve to stimulate and supplement the activities of other agencies and of the various communities that are to be benefited and should be so related to the colleges as in no way to hamper their academic work.

Has not the time come when extension work should be carried on through the coordinated effort of the state department of education, the department or board of agriculture, the colleges, the normal and secondary schools, the churches, the grange, the railroads, the chambers of commerce and other business and commercial bodies, all of which should be associated in a board of direction and should contribute to a permanent and salaried faculty of instruction? There is every reason why the agricultural college should have an important place in the education of the public, but is there now any reason why it should attempt to compass the whole field or burden itself with the entire responsibility, financial or otherwise, for such efforts?

There are those who will argue, I suspect, that the closer limitation of the work of the college faculty to the higher ranges of academic training would cause these institutions to lose their vital connection with public thought and needs. We certainly have no use for a fossilized center of learning in these days when the college must be regarded as a public servant, but to prevent its petrification it is not necessary that the farmers' picnic, the grange hall, the institute platform or the railroad train shall be frequented by the teacher and investigator. These excursions from college halls may be replaced by expeditions for the careful study of social and economic conditions as they are seen on the farm and in the various business operations that are related to agriculture, with no loss, but rather a gain, in the value of the service rendered.

When an issue is raised concerning vocational curriculums we enter upon debatable ground. This audience needs not to be told that many a faculty session has been devoted to a vigorous, even heated, discussion over the relative proportions and distribution of studies in agricultural and engineering courses, for there are present many who are in the midst of a contest that is still being waged. Only general considerations concerning this much-debated matter are in order at this time.

A proper regard for a student's success in after life requires that at least three considerations shall enter into the use of his time and into the arrangement and subject matter of the course of study he is expected to pursue. These are the development of personal power, the cultivation of both the sense and understanding of social and moral obligations and preparation for vocational activity.

The development of personal power is placed first because it is the all-comprehensive factor in determining individual efficiency. It is not attained through the mere storing of information or through familiarity with technical details, for knowledge and skill are but instruments for use. It consists essentially of the power of initiative, the ability to think clearly and to reason sanely and fundamentally, and, above all, it involves that mastery of self and of the raw materials of life that lies at the foundation of all individual success.

Personal power is acquired through discipline, and so the disciplinary value of a course of study is a prime consideration. Have we not to some extent lost sight of the great and abiding truth that the intellectual and moral culture of man as a man

is the only road to either a social or a vocational uplift? In our anxiety to demonstrate the value of these institutions to the material interests of the nation, have we not over-commercialized the instruction, even the atmosphere, of our vocational schools and colleges? The leaders in engineering education are beginning to say so, and is it not true of agriculture? We may well give heed to the words of a recent writer who thus comments on the educational influence of the ancient guilds:

> The soul of this ideal education of the masses was the training of character. They had no illusions that the mere imparting of information would make people better, nor that the knowing of many things would make them more desirable citizens. In none of the higher walks of life does it ever cease to be more the question how much of a man one is, than how much he knows of his special business.

The cultivation of the sense and understanding of social and moral obligations is placed second because human relations and the quality of human effort are determinative factors in the larger successes and satisfactions of life, whether we consider the individual or the social body. It is sound doctrine to declare that, in the last analysis, the defeats of individuals and of nations are moral defeats. Moreover, we now see very clearly that the critical problems which face agriculture are no less social than vocational. Our greater weakness is not in our bread-winning capacity, but in unsound business ethics and in bad social adjustments.

And then, there is the larger relation of the educated man to national welfare. It has been said that the cure for the ills of democracy is more democracy. If more democracy is coming, and it seems to be, we shall sorely need the steadying influence of wise social leadership. The education of the masses is superficial. That keen observer, Mr. Bryce, has said that "it is sufficient to enable them to think they know something about the great problems of politics and insufficient to show them how little they know." Bishop Newman declares that "if a practical end must be assigned to a university course I say it is that of training good members of society. It is the art of social life and its end is fitness for the world." Another writer has observed that the land-grant colleges are ranked as an economic rather than a social force. If this accusation is just, these institutions should purge themselves of an unsound policy. We do violence to the highest interests of the individual and of society if we fail to cultivate in those over whom the mantle of a baccalaureate degree is thrown a sense and comprehension of their obligations to society.

It is a distorted training that emphasizes bread-winning capacity at the expense of fitness for social service. Our national welfare is already threatened by the divorcement of patriotic citizenship from industrial activity.

Preparation for vocational activity is placed last, but not because the equipment of the mind with the facts of science and their applications to the art of agriculture is in any sense unimportant. The colleges of agriculture are dealing directly with the subject matter that is related to the farmer's vocation and they will violate their obligations and limit their usefulness if they do not continue to do so.

In discussing the vocational and training value of courses of study in agriculture I shall simply be ranging myself on one side of this much debated question when I insist that these courses should present good pedagogical form and should lend themselves largely to training in the funda-

mental sciences and present the lowest feasible minimum of ultra-practical subjects.

Remarks concerning pedagogical form may not now be pertinent to any existing situation. It has been said, however, that, in the past, agricultural subjects have been taken out of the normal pedagogical order and placed among the studies of the freshman year, or otherwise distributed illogically in the curriculum, simply that a student's attention shall be held to agriculture and more graduates in agriculture thereby secured. Doubtless such transgressions are not committed now, but if they are they look very much like an attempt to lasso young men and drag them at the heels of expediency. What justification is there for invading the intellectual rights of a student or imperiling his future success by giving him less than the best possible training; and how useless such an expedient! We shall not coerce a man's choice of a life work, however hard we may try to do so. Young men will continue to enter the door that they believe opens to them the largest opportunity, as they always have done and as they ought to do.

It is the subject matter that should engage the attention of the agricultural student concerning which we are likely to differ most widely in opinion. Those who are seeking for members of a faculty or station staff are bound to concede that, as a rule, altogether too many graduates are poorly trained for these positions, largely because they are poorly fitted in the sciences fundamental to the line of work in which they offer themselves.

For instance, candidates for positions in horticulture are generally obliged to confess a woeful lack of acquaintance with physiological botany. Those supposed to be specially trained in animal nutrition rarely have the necessary knowledge of organic and biological chemistry, and graduates in agronomy are likely to be more familiar with superficial facts than with soil chemistry and the science of plant nutrition. Judging cattle, corn and fruit; grafting trees, visiting orchards, calculating rations are exercises of small training value, even small vocational value, compared with severe attention to the processes of nature that underlie agricultural practise of all kinds. If many of the colleges expect to give their graduates a good start on the road to success as teachers and station workers they should seriously consider a curriculum that deals more largely with the fundamental sciences and less with agricultural technics as a superstructure.

And should not the same policy be followed with those who are to enter practical agriculture? A fact of fundamental importance in this connection is that the farmer is equipped for success in farm practise not so much through expert handicraft as through a knowledge of conditions that determine the successful growth of plants and animals; in other words, an acquaintance with nature's processes. The mechanical details of agriculture are comparatively simple, but the control of nature's resources is complex and difficult. With great respect for the opinions of those who hold opposite views, I am constrained to express the conviction that the man is best prepared for the life of a farmer who knows the most about the fundamental sciences and their relation to his vocation, and for this reason I can but regard the time as comparatively inefficiently spent that is devoted in college to observations and exercises of an ultra practical character, or to gaining information that is easily acquired from the ordinary experiences of practical life. This doctrine may be reactionary but it is in accordance with move-

ments now in progress in other vocational schools. We have fallen into the error, it is to be feared, of regarding the student mind as a storage tank for useful facts rather than as an instrument to be fashioned into soundness and efficiency. We must never forget that the farmer is comprehended in the man. And when we realize that many of the graduates of these institutions will exert a dominating influence upon the mental and moral development of young men and women, we see a most important reason why their education should not be confined to the narrow line of technical training. And above all, as has been urged, these graduates are to be members of society.

After all, what are the supreme objects of education? It has been reported, though I do not credit the statement, that a member of an agricultural college faculty once declared that the business of his institution was to bring about the production of more hogs at greater profit. If this remark was made, what a spectacle it pictures! It places the hog at the pinnacle of educational aspiration with man as a lesser figure. In sharp contrast to this gross conception of educational ideals stand the sentiments of great minds who have seen broadly and clearly the larger issues of life.

Hill says of education that it should "quicken a man's mental perceptions, form in him the habit of prompt and accurate judgment; lead to delicacy and depth in every right feeling and make him inflexible in his conscientious and steadfast devotion to all his duties." Milton wrote that "the main skill and groundwork of education will be to temper the pupils with such lectures and explanations as will draw them into willing obedience, influenced with the study of learning and the admiration of virtue, stirred up with high hopes of living to be brave men and worthy patriots."

Listen to Mill:

> The moral or religious influence which a university can exercise consists less in any express teaching than in the pervading tone of the place. Whatever it teaches it should teach as penetrated by a sense of duty; it should present all knowledge as chiefly a means of worthiness in life, given for the double purpose of making each of us practically useful to our fellow creatures and of elevating the character of the species itself.

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A STUDY OF RETARDATION IN THE SCHOOLS OF MINNESOTA[1]

The Materials.—The statistics brought together in this paper were gathered, for the most part, in two separate investigations. One, relating principally to retardation, in all its aspects, was conducted under the auspices of the Minnesota Psychological Conference. The other, concerning itself mainly with the first year of retardation, or with repeaters, was made at the request of the Associated School Boards of Minnesota.

Part of the data collected was laid before these bodies at their respective 1910 meetings. Both reports have been combined, condensed, rewritten, and several sets of other interesting statistics introduced for comparative purposes.

The Schools Studied.—The schools contributing the data on retardation proper are fifty-five of the smaller systems of the state. They each maintain high schools, known in Minnesota as "state high schools," owing to the fact that they are carefully inspected and listed with the State High School Board for a large yearly special grant direct from the state treasury. They are, therefore, schools which are kept at a high state of efficiency.

Only Grade Pupils Considered.—Only the pupils in the grades below the high school are considered, for several reasons. First, the high school students are invariably promoted by subjects, hence accurate statistics as to

[1] Presented before Section L, American Association for the Advancement of Science, at the Minneapolis meeting.

retardation among them, in the usual sense of the term, can not be had. Then, again, with the eighth grade once passed, and often earlier, the most retarded pupils, being safely beyond the compelling influence of the truancy law, or of social opinion, quickly drop out of school and the problem of retardation becomes so confused with the problem of elimination as to make the figures of doubtful value.

A State-wide Study.—The schools studied were well distributed over the state so as to embrace every variety of size, location and environing conditions, and to make the study fairly representative of the entire state, and the results are believed to be an index to the prevailing conditions throughout the state.

The Ayres Standard for Retardation.—In the Ayres investigations, published by the Russell Sage Foundation, children in the first grade are considered normal if they are under eight years of age. In the second grade ages under nine are normal, and so on through the grades. The reasons for thus allowing an extra year are not given. The text asserts that these are the ages allotted to the grades "by common consent." But certainly it is not in accord with the actual practise in administering schools in Minnesota, and I doubt if it is anywhere. Its effect is to conceal one year's retardation for every child during his progress through the grades, provided he entered at six years of age, and last year only 441 children in the schools under consideration entered later than six, while very many entered earlier, as they are usually admitted if they are six by the middle of the year.

A child entering the first grade at six should be in the second grade at seven, the third at eight, and so on. Now suppose he fails to "make grade" while in the second grade and remains there two years, repeating and retarded, yet his age, when he enters the third grade would be only nine. By the Ayres method that would be considered normal, and yet he is retarded. By that method it is possible, then, for every child in a school system to be retarded one year after entrance, and yet the system to appear absolutely free from retarded pupils.

The Minnesota Standard for Retardation.—In every school system covered by this investigation the children are admitted at six years of age or younger. We have reckoned the entering age at six. Further, in every one of these schools promotions are made only once a year, in June. Each grade by its very conception means a year's work. Therefore, the child who enters the first grade at six should enter the second at seven, the third at eight, and so on, grade by grade. And further, from the administrative point of view, the state expects to provide the child with only eight years of grade schooling, which is to begin at the age of six. From this point of view the child who waits till he is seven before entering is already behind the schedule. He will get out later and have one year less of economically productive working life, and that is what the state has in view in the education of its children.

The Tabulated Statistics.—The complete results of the investigation are given in Table A. This gives the grade-age status of 17,279 grade children in fifty-five cities and villages of Minnesota. They were gathered in the fall and account for children actually enrolled. This makes the showing favorable to the schools, for some children who failed to win promotion no doubt dropped out during the summer.

Retardation is computed upon the Minnesota basis of entering at six, and spending a single year and no more, in each grade.

TABLE A

Shows, grade by grade, and by sex, the amount of retardation

Grade	Numbers			Percentages					
				Retarded		Normal		Advanced	
	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
1	2691	1436	1255	38.7	33.6	63.8	59.0	7.5	7.4
2	2065	1096	969	54.0	41.1	37.8	47.2	8.2	11.7
3	2164	1134	1030	61.1	57.7	33.1	40.9	5.8	7.4
4	2268	1134	1134	65.9	56.1	28.2	35.5	5.9	8.4
5	2129	1109	1020	68.8	63.2	25.2	29.8	6.0	7.0
6	1944	977	967	73.7	67.7	21.0	25.0	5.3	8.0
7	1862	929	933	70.4	65.9	24.3	27.1	5.3	7.0
8	2007	886	1121	74.0	67.0	30.5	26.4	5.8	6.6
Total 17,279 Averages:				58.9		34.2		7.1	

In studying this table you will note three things, all, probably, contrary to popular belief. First, the boys equal or exceed the girls in number in every grade up to the seventh, where they fall only four behind. It is in, or at the close of, the seventh grade, then, that the boy meets his decisive defeat. Second, the workings of the process of elimination can be clearly seen in the last three grades. The normally placed child would enter the sixth grade at eleven; the retarded ones would be older. But discouragement, economic pressure in the homes, and the non-applicability or the non-enforcement of the truancy law permits them to drop out. Third, the retardation begins heavily in the very first grade and steadily increases grade by grade through the eighth grade, with the exception of the downward drop of the curve in the seventh grade, due probably to the working of the law of elimination. Also, the retardation of the boys is greater than that of the girls right from the start, and remains so, grade by grade, varying from an excess of 5.1 in the first grade to 7 per cent. in the eighth grade.

The average percentage of retardation officially reported to exist in these schools, under their own standard of requirements is 58.7. As I have said elsewhere when the course of study makes requirements, such that only 41.3 per cent. of the pupils can and do meet them, we have a curious state of affairs resulting, where to be abnormal is the usual or normal state of affairs.

Reduced to the Ayres Standard.—The Ayres method of computing retardation would be incorrect according to the conditions governing the school systems under consideration. But for the sake of comparison, the data on hand have been computed by that method and the results are shown in Table B.

There the average percentage of retardation is 30.9 per cent. And that is serious enough. This, however, is only 52.6 per cent. of that amount known to exist in these schools. The balance is concealed by the allowance of an extra year in the grades, for possible late entrance, when such entrances are so few as to warrant no such allowance.

The Ayres figures for thirty-one important cities give an average of 33.7 per cent. of retarded children, varying from 7.5 in Medford, Mass., to 75.8 per cent. among the colored children of Memphis, Tenn.

TABLE B

This is Table A reduced to the Ayres standard for retardation

Grade	Percentages								
	Numbers			Retarded		Normal		Advanced	
	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
1	2691	1436	1255	14.6	9.1	77.9	83.5	7.5	7.4
2	2065	1096	969	22.5	17.3	69.3	71.0	8.2	11.7
3	2164	1134	1030	30.6	20.8	63.6	71.8	5.8	7.4
4	2268	1134	1134	38.2	27.7	55.9	63.9	5.9	8.4
5	2129	1109	1020	44.2	34.8	49.8	58.2	6.0	7.0
6	1944	977	967	47.4	38.5	47.3	53.5	5.3	8.0
7	1862	929	933	44.2	36.3	50.5	56.4	5.3	7.0
8	2007	886	1121	45.3	39.5	49.2	53.9	5.5	6.6
Total	17.279		Aver.	30.9		62.0		7.1	

TABLE C

Some statistics for purposes of comparison

Children in Grades	Minnesota	Ayres
Of fifty-five systems	58.7	30.9
Of forty-one systems (4–5 teachers)	64.6	33.9
Of four special systems	66.5	33.7
Of St. Paul system		56.5
Of Fargo, N. D., system	55.6	24.9

The forty-one schools given in item two are what are termed "graded schools" in Minnesota. They are small but inspected schools ranking below systems having high schools. They are mostly small, with four to five teachers. They enroll 5,340 grade pupils.

The four "special" cities are large systems whose figures are not included with the fifty-five cities given above. They are conceded to be among the best in the state. They enroll 3,753 grade pupils.

There are 2,087 children in the Fargo contingent.

The St. Paul enrollment in round numbers was	23,000
The other 101 cities and villages enroll	28,459
Table C carries this total	51,459

Repeaters.—Possibly one of the best ways to get at the real loss in a school system is to

compute it from the number of repeaters. Here no confusion results over the question of their age at entrance nor the age limits proper for each grade. Elimination works confusion here as well as by the first method tried. And we must bear in mind that repeaters are only one year's contribution to the full army of retarded children. Financially it is only during the time he repeats that the retarded child costs the taxpayer anything.

In order to ascertain at first hand the amount of repeating in the schools of Minnesota, I recently sent out a printed questionnaire to all the superintendents in the state. Ninety-six, which is nearly half, replied promptly with well-arranged data.

The figures given include a total of 40,710 grade children and 8,302 high-school students. To this number we might add about 28,000 pupils in the grade and high schools of St. Paul which are not included in the main results. That makes a total of 77,012 children investigated as to the repeating among them.

The number of children repeating the work of their grade for this year was found to be as follows:

Grades								
1st	2d	3d	4th	5th	6th	7th	8th	Total
664	309	296	374	396	330	318	443	3,130

Also, 168 others are repeating the work for the second time.

And in the high schools 981 are repeating one subject; 335, two subjects; 108, three subjects, and 60 all four subjects. That is equal to a total of 2,214 in single subjects, or, dividing by four, the number of subjects usually carried by a high school student, we have the equivalent of 553 high school students repeating full work.

This is 7.4 per cent. of the total enrollment in the 96 systems. But this does not adequately measure the ground lost last year in these schools, for two reasons. First, the statistics being gathered in the fall from the actual enrollment of the schools and not compiled from office records does not account for the number of students who dropped out during the summer, and the number thus eliminated must be considerable. Second, and this is an important factor, never alluded to, so far as I have discovered, in the literature of the subject, there is a practise, almost uniform among superintendents, of promoting a child at the end of two years in a given grade, whether his work merits it or not. This practise conceals a considerable amount of the very worst sort of repeating, and likewise, by forcing the child on through the grades, whether deserving or not, reduces the apparent amount of retardation. Akin to this practise is another which has the same effects, of promoting "on trial" children who do not quite meet the requirements, but for one reason or another are permitted to continue on with the class. And need it be added that when once a child has been allowed to go on with the class he is rarely reduced to the grade below, no matter how poor his work?

The data show 1,612 children promoted on trial; there are no figures for the number arbitrarily promoted at the end of the second year in the grade. It is certain that these two practises reduce the actual number of repeating and retarded children considerably.

Compared with Ayres's Results.—While my figures show a considerably larger percentage of retarded children, those of Ayres, curiously enough, show in the fifty-five leading cities given in his tabulated report, that the average percentage of repeaters is 15.4. That is due, I think, to the fact that his method conceals part of the retardation but not of the repeating. Repeating is high in the large cities. If repeating is high retardation should be.

Having carefully studied the laggards in our Minnesota schools from two standpoints, it is interesting to note how strikingly the results agree. We found the percentage of retardation to be 58.9 and that of repeaters to be 7.4. Now, bearing in mind that the number of repeaters is merely one year's quota of retarded ones, and multiplying 7.4 by eight, the number of years in the grade course, we have 59.2 as the calculated number of laggards. The ascertained number is only .3 of one per cent. less than this.

The Money Cost of the Laggards.—School administrators and the public generally would

consider the gist of the whole problem to be its fearful money cost. Money spent on doing the same work twice over is money wasted.

Minnesota spends annually for her schools about $15,000,000, and if 7.4 per cent. of this is spent on repeaters then the loss is $1,110,000.

It is estimated that the nation similarly loses from 57 to 80 millions from the same cause.

We justly boast of our great school fund in Minnesota, of about $27,000,000, but here is a sum two or three times as great wasted yearly in the United States because of loss and waste in our management of the public schools along this one line alone.

The True Loss.—The true loss, however, is the spiritual one, which refuses to submit to statistical investigation. The retarded pupils personally lose that fine spirit of initiative, of progress, of growth, of self reliance and of eagerness to achieve, which constitutes the chief glory of youth, and which sends him from school into life an effective member of society. By allowing him to become retarded that birthright of the American boy is traded for the pottage of idleness, failure and self-distrust.

F. E. LURTON

ANOKA, MINN.

AN ANTHROPOLOGICAL SURVEY OF CANADA

A STEP forward in the development of anthropological studies in America was taken September 1, 1910, by the establishment of a division of anthropology under the Geological Survey of Canada. This gives anthropology a government status in Canada similar to that which it enjoys in the United States, where the Bureau of American Ethnology is recognized as the most important body undertaking the study of aboriginal America. The establishment of the Canadian Division of Anthropology was due primarily to the activity of a committee of the British Association for the Advancement of Science, on the Ethnographical Survey of Canada. This committee, of which Rev. Dr. G. Bryce was chairman, was appointed in 1909 at the Winnipeg meeting of the Association[1] and recommended to the Dominion Government the establishment of a systematic anthropological survey of Canada in connection with the opening of the new national museum. The recommendations of this committee were supported by delegations of the Archæological Institute of America and the Royal Society of Canada.[2] Though the actual governmental recognition of anthropological work in Canada is thus to be immediately credited to the efforts of these scientific societies, in a larger sense the anthropological division is the outcome of many years work on the part of Dr. G. M. Dawson, formerly the director of the Geological Survey, and Dr. Franz Boas. These may be said to have started the ball rolling, the former by the work on the natives of British Columbia that he did in connection with his geological surveys, the latter by the more systematic undertaking of ethnologic, physical anthropologic, and linguistic studies in the same part of Canada in the eighties and nineties under the auspices of the British Association. The present affiliation of the division of anthropology with the Geological Survey is in a large measure due to the personality of Dr. Dawson, to whose earlier efforts, at last analysis, is mainly due the recognition by the Canadian government of the importance of anthropological work. The ethnological and archæological collections of the national museum have their nucleus in collections either obtained by Dawson himself or through his efforts. It is interesting in passing to note that the Bureau of American Ethnology at Washington began by affiliation with the United States Geological Survey, the connecting personality in that case being J. W. Powell.

At the present time the anthropological di-

[1] See Report of the 79th Meeting of the British Association for the Advancement of Science (Winnipeg, 1909), London, 1910, p. cxxxviii. See also Professor J. L. Myres's address to Section H, *ibid.*, pp. 616, 617.

[2] See Report of the 80th Meeting of the British Association for the Advancement of Science (Sheffield, 1910), London, 1911, pp. 265, 266.

vision consists of a scientific staff of three—the writer, who was put in charge as ethnologist and anthropologist on the date already given; Mr. C. M. Barbeau, whose appointment as assistant in anthropology began with January 1, 1911; and Mr. Harlan I. Smith, formerly of the American Museum of Natural History, New York, whose appointment as archeologist took place on June 15 of the same year. The appointment of three men to the scientific staff within a year is not to be taken as mere mushroom growth, but primarily as an evidence of the clear insight on the part of the Canadian government into the needs of anthropology; it was understood at the very beginning that the various scientific interests involved in the term anthropology could not well be successfully undertaken by one man. As it is, the services of a physical anthropologist are badly needed, and it is hoped that before a great lapse of time this important branch of anthropological work will also be adequately provided for.

The work being undertaken by the division is naturally confined in the first instance to Canada itself. However, it is clear that to draw a hard and fast line between Canada and Alaska, Greenland, and the United States is in many respects artificial. Owing to the necessity of including Alaska and Greenland in a general study of the Eskimos, it goes without saying that these territories will at least to a certain extent have to be included in the work of the division. In the case of tribes which, like the Ojibwa and Iroquois, are found within the borders of both Canada and the United States, it is clear that the division will be called upon from time to time to pass the boundary. In some cases, as in that of the Ottawas and Wyandots of Oklahoma, what were formerly Canadian tribes have moved far south well within the bounds of the United States; also in these cases "trespassing" is logically necessary.

So much for the geographical limits set. The subject matter of the work undertaken may be conveniently classed under the heads of ethnology, archeology, physical anthropology, for which, as already noted, there is at present no adequate provision, and linguistics. While it is perfectly clear that cultural, physical and linguistic units do not need to, and in numerous instances actually do not, coincide, it should be emphasized that all three classes of units are to a large extent interwoven; not infrequently slim evidence for a point of reconstructed culture-history obtained from the study of one of these may be strengthened and even reduced to certainty by evidence derived from a study of one of the others. It is no mere accident that the Eskimos form a clearly established unit as regards culture, physical type and language. It is thus clear at the outset that any thoroughgoing attempt to attack the problems of aboriginal America must make use of all three units of classification.

To many it will seem that much has already been done in the study of Canadian ethnology. Relatively to other parts of the world that might be named this is true. The results of the Jesup North Pacific expedition have done much to clear up the cultural problems of the West Coast; the culture of the Eskimos in its main outlines and, in certain cases, even in detail can be said to be well ascertained through the researches undertaken, among others, by the Bureau of American Ethnology and the American Museum of Natural History; finally, the Plains and Eastern Woodlands cultures have been studied to a limited degree by Wissler and Hoffman, to mention but two of the ethnologists who have concerned themselves with these areas.[3] Relatively, however, to the standard that must be set for ethnological work both in completeness and thoroughness, the work already accomplished represents but a small fraction of what students of primitive cultures would like to see done. Each of the five culture areas into which it is customary to divide Canada (Eastern Woodlands, Arctic or Eskimo, Plains, Plateau-Mackenzie and West Coast) still present problems of great importance; in

[3] The late Dr. William Jones is known to have obtained a mass of valuable ethnological and linguistic data on the Ojibwa, but his results are as yet inaccessible to students.

some cases it may even be said that the satisfactory proof of the existence of the culture area as a definite unit in contrast to other areas still remains to be proved. This is particularly true of the Eastern Woodlands and Plateau-Mackenzie regions, both of which are perhaps more negatively than positively characterized by contrast to neighboring cultures that have a more definite individuality of their own. It is yet to be demonstrated whether there is really enough of fundamental importance in common to such widely differing tribes as the Nascopie, Iroquois and Ojibwa to warrant their inclusion in a single Eastern Woodlands culture area. This reservation may turn out to be justified also in the case of the Athabascan tribes of the Mackenzie River region as compared with the Kootenay and Salish tribes of the plateau to the west.

Naturally, before these wider problems can be intelligently discussed, more explicit data than are now available must be obtained on such tribes. Outside of the work already referred to of Hoffman on the Ojibwa and Menominee, work moreover which concerns itself with tribes located within the borders of the United States, there is almost nothing published of great merit on the aboriginal cultures of the Eastern Woodlands. Nascopie, Montagnais, Malecite, Micmac, Abenaki, Algonkin, Ottawa, Cree are names frequently enough met with in ethnological literature, yet concerning which, when all is said and done, little enough is known. Even the Iroquois have been neglected to a most astonishing extent. Morgan's Iroquois work, as pioneer work, was invaluable and still commands high respect, yet, as is becoming increasingly evident, needs careful revision. Moreover, the scale on which he worked was much too small to satisfy the requirements of ethnological students to-day. Many problems of interest in the Eastern Woodlands await solution. Some of these are: The extent of influence of the Eskimos, if any, in the lower St. Lawrence region; the extent and characteristics of the birch-bark industry in this culture area; the establishment of the range of the various types of houses used; the clear understanding of the distribution and development of the different types of social organization, from the apparently amorphous bands of the Crees to the complex organization of the Iroquois; the possibly intrusive character of the Iroquois culture itself in this area; the development of a distinctive maritime culture among the Micmacs.

The Eskimo, though, as already noted, already satisfactorily investigated, still present many problems of interest. Several of the less easily accessible tribes are as yet practically unknown. Until these have been investigated it will be difficult to undertake a satisfactory analysis of Eskimo culture as a whole, and, consequently, of its relations to the neighboring cultures.

In the Plains region the Sarcee and Western Cree are as yet hardly more than mere names. The Assiniboine have not yet been exhaustively treated, while Dr. Wissler's study of the Blackfeet, though promising from what he has already published to be eminently satisfactory, will doubtless leave something to be desired owing to the fact that his material was not obtained with the help of linguistic study.[4] Naturally the religious, social and other problems of the Plains region can not be discussed without reference to the Plains tribes of the United States, yet at least two problems peculiar to the Canadian Plains may be pointed out. Both of them are studies of Plains influence exerted on an originally Woodlands tribe. Reference is had to the culture of the Plains Cree and to that of the Saulteaux or Plains Ojibwa.

The Plateau-Mackenzie area is known least satisfactorily of all. Teit's work on the interior Salish tribes of southern British Columbia

[4] It may be said incidentally that all investigation of native mythology, rituals, songs and allied subjects, undertaken without the help of linguistic study, must fail to result in a complete understanding of the native concepts involved. We would not think much, for instance, of a student of the history of the Roman Catholic church that knew no Latin, or of a discussion of German folk songs, even in their purely musical aspect, not based on some familiarity with German itself.

constitutes a model of ethnological research, but the tribes that he describes have been so much influenced by the West Coast and Plains cultures that they are presumably far less typical of the culture area than the Athabascan tribes of the Mackenzie Valley. A thorough investigation of these tribes (Chippewyan, Slaves, Yellow Knives, Dog Ribs, Hare and Loucheux) is probably the greatest single need of ethnological research in Canada. Among these tribes, if anywhere in the dominion, we may expect to find the simplest and most fundamental forms of aboriginal American culture, granted that there is such a thing as a fundamental American culture substratum. The Athabascan tribes to the west, including the various tribes of the interior of Alaska known as Kutchin, are also important in this connection. Similarities in culture which are likely to turn up between the Plateau-Mackenzie and Eastern Woodlands regions (one may instance the similarity in technic between the birch-bark basketry of the east and that in the west of Athabascan and Interior Salish tribes) may be explained as due either to the persistence of fundamental American traits in both regions—we would be here dealing with Dr. Boas's "marginal" theory—or to the secondary spread of such features from one region to the other.

In the West Coast area many cultural problems likewise await investigation. Only of the Kwakiutl can it be said that we have a really exhaustive series of studies, due to Dr. Boas's many years of research, accessible to the student. For the Haida and Tlingit much of fundamental value has been already published, notably by Dr. Swanton, yet here our knowledge is less complete. Of other important tribes of the area (Bella Coola, Bella Bella, Tsimshian, Coast Salish and Nootka) we are relatively uninformed, except in regard to particular points here and there. Further research on these latter tribes will not only serve to give us a more complete picture of the distinctive culture of this region, but may cause us to modify somewhat our idea of certain fundamental elements of the culture. It may be pointed out, for instance, that the Nootka do not illustrate a pure system of paternal descent, for the writer found that all sorts of privileges, even of such purely masculine interest as rights to whaling secrets and rituals, could be inherited through the female as well as male line of descent.

Of scientific work in Canadian archeology there is doubtless even less at the disposal of students than of ethnology. If we except the work of Mr. Harlan I. Smith on the coast and interior of southern British Columbia, and some rather scattering work done by Boyle and others connected with him in Ontario, there is almost nothing to record that is worthy of serious consideration. An archeological survey of Canada must be of the greatest possible assistance to the student of Canadian aboriginal culture in estimating what elements of material culture are truly characteristic of any particular culture area and what on the other hand are due to secondary influence. It is to be expected that many problems touching the movements of population in early times and the centers of the dispersion of cultural elements will receive great aid from archeological methods.

Our knowledge of the native languages of Canada is far from complete, even where considerable masses of grammatical and text material are at our disposal. The quality of the work is not generally all that can be desired. Of Kwakiutl, Tsimshian and Haida we have a reasonably satisfactory knowledge, of the other languages of Canada we are in many cases already informed of the fundamental traits of structure and in some cases, as in that of Ojibwa, we even possess extensive dictionaries, yet a poor phonetical groundwork and a failure to grasp the traits of morphology from a purely objective standpoint vitiate the value of much of this material. Adopting a reasonably high standard of linguistic work, such as one might now adopt in discussing works dealing with Indogermanic or Semitic linguistics, we can safely say that, so far as represented in Canada, none of the Athabas-

can,[5] Salish, Kootenay, Eskimo,[6] Algonkin or Iroquois languages have as yet been adequately dealt with. The time is at hand when purely descriptive linguistic study in America will have to be supplemented by comparative and reconstructive work; it is becoming increasingly evident that such research requires the most minute attention to phonetic detail.

The physical anthropology of aboriginal Canada needs to be put on a sounder and wider basis than heretofore. Outside of Dr. Boas's work on the physical types of the West Coast and interior regions adjoining the coast, practically nothing has been accomplished in Canada with strict regard to scientific method. As a result all present attempts to classify the native physical types of the dominion must be merely approximate.

It can hardly be hoped that the newly established division of anthropology will be able unaided to make the ideally complete survey that has been outlined. The cooperation of other institutions and individuals interested in anthropological problems is not only welcome but necessary. Complaints are sometimes heard as to the duplication of field work among natives. Rightly considered such duplication should always be welcomed, for the personal equation in the investigation of social sciences is a feature which, though often tacitly ignored, must always be reckoned with.

The ethnological work already undertaken by the division embraces three distinct lines of inquiry. The first of these was undertaken by the writer among the Nootka, and resulted in the amassing of much material of linguistic and ethnological interest. It is intended to carry forward this work from year to year. The second line of inquiry is the analysis of the culture of the Iroquois, including under this term the Huron-Wyandots, who were never included in the league. This work was undertaken for the Huron-Wyandots by Mr. Barbeau, who, beginning with the Hurons of Lorette and the few Wyandots still left in western Ontario, took up an intensive study of the most conservative group of Wyandots, those of Oklahoma. The study of the Iroquois proper, particularly from the point of view of social organization, was entrusted to Dr. A. A. Goldenweiser, of Columbia University, who has amassed much of value at Grand River Reserve. The third point of attack was the culture of the eastern Algonkin tribes. Here a beginning was made by Dr. Cyrus MacMillan, of McGill, among the Micmac, and by Mr. W. H. Mechling among the Malecite. It is hoped to begin systematic work among the Cree, Ojibwa, Plains tribes and tribes of the Plateau-Mackenzie region as soon as opportunity will permit. So far the archeological work of the division has been confined to a preliminary reconnaissance, by Mr. Smith, of the field in eastern Canada. Hand in hand with research and publication, which must naturally form the main activity of an anthropological survey of Canada, is the building up of an anthropological section of the national museum at Ottawa. At present the museum is relatively rich in West Coast ethnological and Ontario archeological material to the neglect of other fields. Persistent efforts are now being made to round out the resources of the museum.

The Canadian government is to be congratulated on having established a systematic survey of aboriginal Canada. Now or never is the time in which to collect from the natives what is still available for study. In some cases a tribe has already practically given up its aboriginal culture and what can be obtained is merely that which the older men still remember and care to impart. With the increasing material prosperity and industrial development of Canada the demoralization or civilization of the Indians will be going on at an ever increasing rate. No shortsighted policy of economy should be allowed to interfere with the thorough and rapid prosecution of the anthropological problems of the dominion. What is lost now will never be recovered again.

E. SAPIR
GEOLOGICAL SURVEY OF CANADA

[5] Yet Father Morice's grasp of Carrier phonetics seems excellent.

[6] Except for Kleinschmidt's and Thalbitzer's work on Greenland Eskimo.

THE MUSEUM OF ANTHROPOLOGY OF THE UNIVERSITY OF CALIFORNIA

The Hearst collections in archeology and ethnology of the University of California, were opened for public exhibition on October 4, 1911, in its temporary quarters at the Affiliated Colleges in San Francisco, with a reception tendered by Mrs. Phoebe A. Hearst and the regents of the university to 400 guests.

Mrs. Hearst organized expeditions in California and in Peru, Italy and Egypt in 1899 and 1900, though more or less systematic collecting had been supported by her for some years previous. In 1901 a department of anthropology was organized, of which F. W. Putnam was director from 1903 to 1909. In 1903, owing to lack of suitable building on the campus at Berkeley, the bulk of the collections was removed to the vacant western building at the affiliated colleges, which measures about 75 by 100 feet and includes three stories and a basement. Here the collections were gradually unpacked, ordered, catalogued and put into a condition of accessible storage, which rendered them available for study and for the inspection of limited parties of visitors.

During 1911 Mrs. Hearst provided for placing the greater portion of the collections under glass, to assure their protection and make possible their public exhibition. The museum is now open to visitors daily throughout the year, excepting Mondays, but including all Sundays and holidays, from 10 A.M. to 4 P.M. The exhibits displayed consist of: Ethnology of the California Indians; Archeology of Peru; Archeology of Greece and Italy; Archeology of Egypt, and a revolving exhibit. This last is changed periodically at intervals of about two months, a new unit collection illustrating some definite point in the history of man, or showing some new accession, being installed each time. In addition, exhibits of the ethnology of the Indians of the north Pacific coast, and of the southwest, are in course of preparation.

A part of the Peruvian and Egyptian collections, all the abundant series of specimens illustrating the archeology of California, and the material from the Plains Indians, the Pacific Islanders, the Philippines and other regions, must remain, for the present at least, in storage, awaiting either the permanent building that will ultimately be the home of the collections, or a more extensive equipment than is now available.

Mrs. Hearst's gifts to the museum and the researches carried on in connection with its work have approximated a million dollars, making the largest single contribution to the furtherance of anthropology ever made in America and perhaps in the world. The present value of the collections may be estimated to be several times their original cost. A number of other patrons who have supplemented Mrs. Hearst's efforts have helped to round out the collections and bring them up to a total of 70,000 well coordinated specimens. There are only two other university museums of anthropology in the country that are comparable in scope and importance, and only the great general museums in New York and Chicago, and the National Museum in Washington, surpass the university's museum in size. Both as regards magnitude of the collections, therefore, and the extent of investigations prosecuted, as represented in the publication in American archeology and ethnology, the university occupies a distinctive place among the institutions of the country that have given their attention to anthropology.

SCIENTIFIC NOTES AND NEWS

The Symons gold medal of the Royal Meteorological Society has been awarded to Professor Cleveland Abbe, of the United States Weather Bureau.

Dr. J. M. T. Finney, associate professor of surgery in the Johns Hopkins University, has declined to permit the committee of trustees in charge to present his name for the presidency of Princeton University.

Professor R. DeC. Ward has been elected a corresponding member of the Deutsche Meteorologische Gesellschaft.

PROFESSORS W. H. PERKIN, F.R.S., and E. Rutherford, F.R.S., of the University of Manchester, have been elected corresponding members of the Munich Academy of Sciences.

AT its last meeting the Rumford Committee of the American Academy of Arts and Sciences made the following appropriations: To Professor John Trowbridge in aid of the researches upon thermoelectricity of Mr. Harvey C. Hayes, of Harvard University, $300; to Mr. Frank W. Very, for his research on the intensity of spectrum lines, additional to previous grant, $150; to Professor Robert W. Wood, in aid of his researches on the optical properties of vapors and on long heat waves, additional to previous grant, $225.

THE Australian Antarctic expedition, under the leadership of Dr. Douglas Mawson, sailed from Hobart for the south in the ship *Aurora,* on December 2.

MR. E. A. COCKEFAIR, professor of agriculture in the State Normal School, Cape Girardeau, Mo.; Professor Arthur D. Cromwell, of Humboldt, Ia., and Mr. S. K. White, of Ames, Ia., have accepted positions to do extension work in agriculture for the Agricultural College in Porto Rico.

PROFESSOR J. H. NORTON, who has been in charge of the Citrus Experiment Station, University of California, located at Riverside, Cal., for the past three years, has handed in his resignation to take effect February 1, 1912. Professor Norton will fill the position of horticulturist for the Fantana Development Company, Rialto, Cal.

E. P. CATHCART, M.D., D.Sc., Grieve lecturer in chemical physiology, University of Glasgow, has been appointed research associate of the Carnegie Institution of Washington, and is spending the present academic year in research on metabolism in the Nutrition Laboratory in Boston.

THE Massachusetts Institute of Technology has had for a visiting guest Senor Joao Ferlini, secretary of the College of Engineers, Porto Alegre, Brazil. He has made the tour of the technical institutions of Europe, it being the intention of the government of Brazil to send a number of the best of the students to some foreign institutions to finish their studies.

THE following announcements are made in English journals by the British Meteorological Office: Mr. G. I. Taylor, fellow of Trinity College, Cambridge, Smith's prizeman, 1910, has been appointed Schuster reader in dynamical meteorology for three years from January 1, 1912; Mr. L. Southerns, of Emmanuel College, Cambridge, has been appointed special assistant at Eskdale Observatory; Mr. G. Dobson, research student of Gonville and Caius College, Cambridge, has been appointed graduate assistant for research in atmospheric electricity for one year from October 1, 1911. Dr. Arthur Schuster, F.R.S., has presented to the Eskdale Observatory an instrument, made in St. Petersburg from designs by Prince Boris Galitzin, for the registration of the vertical component of seismic movements. Dr. Schuster had previously presented corresponding instruments for registering the horizontal component, so that all three components are now the subject of continuous registration.

PROFESSOR W. T. PORTER, of the Harvard Medical School, gave the Weir Mitchell lecture at the College of Physicians in Philadelphia, on November 3. His subject was "Surgical Shock."

DR. L. A. BAUER gave an address before the Kononklijke Natuurkundige Vereeninging of Batavia, Java, on October 25, the subject being, "The Non-magnetic Vessel, the *Carnegie,* and Her Work."

AT a meeting of the Columbia Chapter of Sigma Xi on November 28 an illustrated lecture on the electric lighting of New York City was given by Professor J. F. Sever, the president of the chapter.

DR. C. P. STEINMETZ recently delivered two lectures before the engineering students of the University of Illinois. The subjects were "Unexplored Fields in Engineering" and "The Nature of Electrical Energy." The audience at each lecture crowded the lecture-

room of the physics building, in which the lectures were given.

Professor John Perry, F.R.S., delivered the address at the opening of the new mechanical engineering laboratory of the Municipal Technical Institute, Belfast, on November 24.

A life-sized marble statue of Æsculapius, a replica of one in the Vatican, was presented to the College of Physicians, Philadelphia, by Dr. Richard H. Harte, and accepted on behalf of the college, by Dr. S. Weir Mitchell, at the November meeting of the college.

Memorial exercises in honor of John Bascom, a former president of the University of Wisconsin, will be held at the university on December 6. President Charles R. Van Hise, of the university, will preside at the exercises and Dean E. A. Birge, a personal friend of Dr. Bascom, will deliver the principal address. James F. Trottman, of Milwaukee, president of the university board of regents, will speak on behalf of that body, while Judge R. G. Siebecker, of the Wisconsin Supreme Court, will represent the alumni.

A brass tablet has been unveiled by the Master of Peterhouse in the College Chapel, Cambridge, in memory of Dr. Arthur Jackson, who died at Mukden, Manchuria, in January last, in his brave efforts to stem the advance of the plague into China.

Dr. J. F. W. Ross, professor of gynecology in the University of Toronto, died on November 17, from injuries received in a motor-car accident.

Dr. William Sutherland, of Melbourne, known for his contributions to molecular physics, has died at the age of fifty-two years.

Mr. Eugene William Oates, who while engaged in the British India Service and afterwards, published several books on ornithology, died on November 16, aged sixty-six years.

Formal distribution has been made of the California property of the late D. O. Mills. The Metropolitan Museum of Art, New York, receives $100,000, the American Museum of Natural History $100,000, the New York Home for Incurables $100,000, the New York Botanical Garden $50,000, the American Geographical Society $25,000 and the American Red Cross Society $25,000.

The annual dinner of the New York Academy of Sciences and affiliated societies will be held at the Hotel Endicott on December 18, and will be followed by the annual meeting of the academy for the reception of reports and election of officers. The address of the retiring president, Dr. Franz Boas, who is at present on leave of absence from Columbia University to serve as professor of anthropology in the University of Mexico, will be presented. This will be followed by an illustrated address by George Borup, who was one of Admiral Peary's scientific associates on his Polar expedition.

The Edinburgh University Club has been established in New York City and the inaugural dinner will be held at the Astor Hotel on December 27. All graduates and undergraduates of the Edinburgh University are invited to be present. Particulars regarding the club may be obtained from the interim secretary, Dr. W. F. Maloney, 20 E. 69th St., New York City.

The second International Congress of Entomology will be held, as has already been announced, at Oxford on August 5–10, 1912, under the presidency of Professor E. B. Poulton, F.R.S. According to a note in *Nature* the executive committee proposes to find for members of the congress lodgings in the town, or rooms in one or more of the colleges at a moderate charge; rooms in college will be available only for men. The executive committee invites an early provisional notice of intention to join the congress, in order to be able to make the arrangements for the necessary accommodation. The proceedings of the first congress are in the press and will be published shortly. All communications and inquiries should be addressed to the general secretary of the executive committee, Dr. Malcolm Burr, care of the Entomological Society of London, 11 Chandos Street, Cavendish Square, London, W.

THE new student ward in the Madison General Hospital will be ready for patients within a short time and will provide the University of Wisconsin with much needed facilities for caring for sick students. The new ward consists of two adjoining rooms and a heated sun porch, which are located on the first floor of the recently constructed addition to the hospital. Nine students can be accommodated in the ward at one time. The student ward in the city hospital is the result of many years' agitation, both on the part of citizens and students. Seven hundred dollars was raised for the ward by students of the university and Thomas E. Brittingham, of Madison, a regent of the university, gave $5,000 to the hospital on condition that a ward for university students be maintained.

THE government of the Federated Malay States has, as we learn from the London *Times*, offered to make a collection of the fauna of that region for presentation to the Zoological Society of London, and the council of the society has cabled an acceptance of the offer. Mr. Herbert C. Robinson, the director of the States' Museums at Kuala Lampur, has been entrusted with the formation of the collection, and already a number of animals have been obtained. The Zoological Society has agreed to send out a keeper to arrive in Selangor about the middle of March, 1912, to assist in preparing the animals for shipment and to return with them to England. The collection will leave Port Swettenham about the middle or the end of April, so as to avoid the rough monsoon in the Indian Ocean and to arrive in London in early summer. The collection will be exhibited throughout the season of 1912 as that of the Federated Malay States. The more permanent of the enclosures for the king's African collection have been retained, and the Malay animals will be placed in them.

THE first volume of the "Annual Tables of Constants and Numerical Data, Chemical, Physical and Technological," compiled and published by an International Commission appointed by the seventh International Congress of Applied Chemistry (see SCIENCE, August 4, 1911), is now open to subscription. Subscription blanks, the terms of subscription and descriptive leaflets may be obtained from any one of the three American commissioners: Dr. G. N. Lewis, the Massachusetts Institute of Technology, Boston, Mass.; Professor G. F. Hull, Dartmouth College, Hanover, N. H., and Professor J. Stieglitz, the University of Chicago, Chicago, Ill.

WITH the issue for January–March, 1912, *The American Journal of Religious Psychology and Education* will become the *Journal of Religious Psychology, including its Anthropological and Sociological Aspects,* having as editors President G. Stanley Hall and Professor Alexander F. Chamberlain. The journal will continue to be published at Clark University under the auspices of the library.

A MINNESOTA geographical society was recently organized at the University of Minnesota. Professor Edward M. Lehnerts, of the department of geology and geography, was chosen president and Professor F. C. Miller, of the St. Paul Central High School, was chosen secretary-treasurer. Professor Sardeson, of the university, spoke on the opportunities for geographical excursions in and around the Twin Cities. The following were appointed a committee to plan for excursions for the late fall and next spring; Professor Sardeson; Warren Upham, librarian of the state historical society; Professor D. Lange, of St. Paul; Eugene Van Cleff, of the Duluth Normal School; Charles C. Colby, of the Winona Normal, and Jack Haynes, of the Northern Pacific Railway.

AT the first meeting of the year of the Biological Club at the Oregon Agricultural College, Professor Victor L. Gardner gave an address on "Fundamental Factors of Plant Nutrition with Special Reference to the Blueberry." A second address on "The Relation of Plant Pathology to the Other Biological Sciences" was given by H. L. Rees, of the crop pest staff, and H. S. Jackson, professor of botany and plant pathology, spoke on the new additions to the plant pathological library.

The surgeon general of the army announces that preliminary examinations for the appointment of first lieutenants in the Army Medical Corps will be held on January 15, 1912, at points to be hereafter designated. Full information concerning these examinations can be procured upon application to the "Surgeon General, U. S. Army, Washington, D. C." The essential requirements to securing an invitation are that the applicant shall be a citizen of the United States, shall be between 22 and 30 years of age, a graduate of a medical school legally authorized to confer the degree of doctor of medicine, shall be of good moral character and habits, and shall have had at least one year's hospital training as an interne, after graduation. The examinations will be held concurrently throughout the country at points where boards can be convened. Due consideration will be given to localities from which applications are received, in order to lessen the traveling expenses of applicants as much as possible. The examination in subjects of general education (mathematics, geography, history, general literature and Latin) may be omitted in the case of applicants holding diplomas from reputable literary or scientific colleges, normal schools or high schools, or graduates of medical schools which require an entrance examination satisfactory to the faculty of the Army Medical School. In order to perfect all necessary arrangements for the examination, applications must be complete and in possession of the adjutant general at least three weeks before the date of examination. There are at present sixty-four vacancies in the Medical Corps of the Army.

A set of 214 enlarged photographs, illustrating plant societies, habit-, flower- and fruit-characters of trees and other higher plants, as well as habit and structural characters of some of the larger algæ and fungi, has been installed in the systematic museum of the New York Botanical Garden. The photographs, which are 11×14 inches in size, are mounted in glazed frames, 43 of them bearing four each of the bromide enlargements and seven bearing six each. The frames are fastened to the walls of the museum on the second floor and, so far as practicable, have been placed near the cases containing representatives of the species illustrated. The enlargements have been made chiefly from 4×5 negatives obtained by various garden expeditions to Florida, the Bahamas, Cuba, Haiti, Santo Domingo, Porto Rico and Panama.

The Polish National Alliance of the United States of North America has presented to the National Museum an extensive and interesting series of coins of the kingdom of Poland issued during its day of independence. The collection has been placed on exhibition in the west hall of the old building of the National Museum. The series comprises 312 pieces of money, most of which are silver, ranging in size from our old silver three-cent piece to the present-day silver dollar. The series begins as far back as 1386 and covers a period of 449 years.

The *Harvard University Gazette* records among the activities of the Peabody Museum that during the summer Dr. Alfred M. Tozzer and Mr. Clarence L. Hay made a trip to Mexico. Mr. Hay purchased a valuable collection which he has given to the museum. Dr. Charles Peabody represented the museum at the Prehistoric Congress of France, held at Nimes in August, 1911, and presented a paper on "The Archeology of the Delaware Valley," with special reference to the work of Mr. Ernest Volk. While in Europe Dr. Peabody visited several prehistoric sites, and collected, with the assistance of his European colleagues, representative specimens from the eocene, pseudo-eolithic site of Clermont-de-l'Oise; the eolithic industries of Salinelles (Gard); the industries, neolithic and others, near Orpierre (Hautes Alpes); the Lake Dweller stations of the Saut de la Pucelle and of La Gresine, Lac du Bourget (Savoir). The research in relation to the antiquity of man in America was continued in the Delaware Valley by Mr. Ernest Volk, and a report by Mr. Volk on the twenty-two years of research in this region has been published by the museum. Dr. George P. Howe conducted an expedition to Yucatan and has prepared a report on the

results. Mr. Samuel J. Guernsey carried on archeological researches in New Brunswick for the museum. The museum had a party in Ohio under the direction of Mr. B. W. Merwin, and the long-continued exploration of the ancient cemetery at Madisonville, as well as the famous Turner Group of Mounds in the same region, has been completed.

UNIVERSITY AND EDUCATIONAL NEWS

IT is announced that the sum of $1,526,965 has been collected for McGill University. Included in the sum are three subscriptions of $100,000 each from Dr. James Douglas, of New York, Mr. Robert Reford and the Birks family, of Montreal.

LAST year Mr. John D. Rockefeller offered to give $250,000 to a special endowment fund of the Medical Department of Western Reserve University on condition that a total fund of a million dollars was given. At that time Mr. H. M. Hanna gave $250,000 as part of the required amount. It is now announced that the sum of $429,000 has been given, leaving $71,000 to be collected before December 31.

DARTMOUTH COLLEGE will eventually receive what is believed to be approximately $200,000 by the will of Elijah M. Topliff, of Manchester, N. H.

NEW greenhouses have been erected at the University of Vermont at a cost of $7,000. The buildings consist of a head house 24 × 84 feet, a story and a half high, and three parallel glass houses each 20 × 60 feet. These houses are for the combined use of the department of horticulture, botany and plant pathology: one of the houses is entirely for experimental work, and will be occupied by the experiment station men; the other two houses are for teaching purposes.

THE registration of students in several of the larger universities is reported to be as follows: Columbia, 7,429; Chicago, 6,466; Minnesota, 5,965; Wisconsin, 5,538; Pennsylvania, 5,389; Michigan, 5,381; Cornell, 5,104; Illinois, 5,118; Harvard, 5,028; Nebraska, 4,624; California, 3,450; Missouri, 3,141.

RECENT appointments in St. Louis University School of Medicine are: A. S. Pearse, Ph.D. (Harvard), associate professor of biology, in charge of the department; H. G. Bristow, A.M. (Missouri), instructor in chemistry; A. M. Brown, A.M. (Washington University), assistant in biology; L. F. Shackell, B.S. (St. Louis), instructor in pharmacology.

DR. CHARLES SHEARD has resigned as professor of preventive medicine in the University of Toronto.

M. RANVIER, professor of general anatomy at the Collège de France, has, at his own request, been allowed to retire.

DISCUSSION AND CORRESPONDENCE

THE FRANCIS GALTON LABORATORY FOR NATIONAL EUGENICS

TO THE EDITOR OF SCIENCE: In examining the correspondence of the late Sir Francis Galton I find very many appreciative letters concerning his work from Americans distinguished in science or social activities. Sir Francis held the faith—and did much to demonstrate it—that man both mentally and physically was the product of his ancestry, and that accordingly when this was once fully recognized, man could achieve a greater future by encouraging the multiplication of the fit, and restricting the production of the unfit. He devoted most of the later years of his life to preaching this gospel and left the residue of his fortune to maintain the staff of the laboratory which bears his name. The science of eugenics, defined as "the study of agencies under social control that may improve or impair the racial qualities of future generations either physically or mentally," has been his creation. The idea that we can study at the university what makes for or mars national welfare is not a narrow one, it is essentially international in character. And that view of it is emphasized by Sir Francis Galton's world-wide correspondence. That correspondence leads me to believe that in America, and elsewhere, there may be men and women willing to aid us in founding a worthy memorial

to the life-work of Sir Francis Galton—to his great idea that the future of mankind lies largely in man's own hands, if he will but pay the same attention to his own reproduction that he gives to that of his cattle and his dogs.

The memorial to Sir Francis has taken the fitting form of a building, with public museum, library and lecture hall, with rooms for research students, for experimental work, and for staff—to be called the Galton Laboratory. The sum required is $70,000, of which nearly $12,000 have already been subscribed by Sir Francis's personal and scientific friends in this country. Any one wishing to aid in this memorial to a man, scarcely less noteworthy in science than his cousin Charles Darwin, should communicate with Sir Edward Henry Busk, the treasurer to the Francis Galton Memorial Fund, University of London, England.

Karl Pearson

An Early Discussion of Heredity

I have lately come across a passage which seems worthy of being put on record against the time when the history of opinion and discovery in the science of heredity comes to be written. It is to be found in a work entitled "The Religion of Nature Delineated," by William Wollaston, some time of Sidney Sussex College at Cambridge, a member of the distinguished family which has contributed so largely to scientific knowledge. In Section VIII. of that work, dealing with "Truths Concerning Families and Relations," the author argues that the affection which determines the sense of obligation between relatives is directly dependent upon the intensity of the consanguinity that exists between them. Such consanguinity is regarded as a physical relation which decreases in geometrical proportion with each succeeding generation. The passage would appear to be an adumbration of the views subsequently elaborated by Francis Galton and others. I know of no earlier statement of the quantitative aspect of hereditary phenomena, but should such be known to any of your readers I should be grateful for the reference. The passage transcribed below is taken from a copy of the sixth edition of Wollaston's work which was published in 1738. The book originally appeared in 1722.

The foundation of all *natural relation* is laid in *marriage*. For the *husband* and *wife* having solemnly attached themselves each to other, having the same children, interests, etc., become so intimately related as to be reckoned united, *one flesh*, and in the laws of nations many times *one person*. Certainly they are such with respect to the posterity, who proceed from them jointly. The *children* of this couple are related between themselves by the mediation of the parents. For every one of them being of the *same blood* with their common parents, they are all of the same blood (truly *consanguinei*), the relations, which they respectively bear to their parents, meeting there as in their *center*. This is the *nearest* relation that can be, *next* to those of man and wife, parents and their children, who are *immediately* related by contact or rather continuity of blood, if one may speak so. The relation between the children of these children grows more *remote* and *dilute*, and in time wears out. For at every *remove* the natural tincture or sympathy may be supposed to be weakened; if for no other reason, yet for this. Every *remove* takes off *half* the common blood derived from the grandparents. For let C be the son of A and B, D the son of C, E of D, F of E: and let the *relation* of C to A and B be as 1: then the *relation* of D to A and B will be but $\frac{1}{2}$; because C is but one of the parents of D, and so the *relation* of D to A and B is but the half of that, which C bears to them. By proceeding after the same manner it will be found, that the *relation* of E to A and B is $\frac{1}{4}$ (or half of the half), of F $\frac{1}{8}$: and so on. So that the *relation*, which *descendents* in a direct line have by blood to their grandparents, *decreasing* thus in geometrical proportion, the *relation* between them of *collateral* lines, which passes and is made out through the grandparents, must soon be reduced to an inconsiderable matter.

If then we suppose this *affection* or sympathy, when it is permitted to act regularly and according to nature, no reason intervening to exalt or abate it, to operate with a strength nearly *proportionable* to the quantity or degree of relation, computed as above, we may perhaps nearly discern the *degrees* of that obligation, which persons related lie under, to assist each other, *from this motive*.

R. C. Punnett

NOTE ON THE OHIO PLACODERM DINICHTHYS TERRELLI

In a recent paper[1] Professor Branson describes and figures a specimen of the Devonian "fish" *Dinichthys terrelli,* in the Oberlin collection—a specimen evidently of great value, for it presents for examination many parts, largely in their natural relations, of one and the same individual. Similar specimens, as one recalls (not without chagrin) have earlier been found, and possibly even better ones, but their parts have never been kept together: for the zeal of pioneer collectors led them to separate all possible plates from the matrix, and caused the destruction of smaller undetachable elements, leading, naturally, to a less complete understanding of the anatomy of the "fish." In the present case Dr. Branson has been able to add interesting notes to our knowledge of this classic fossil; he has shown especially that the "clavicular" element of this species is smaller in its proportions than has hitherto been described, and he notes, very justly in this regard, that the restoration of the huge head of *D. terrelli* exhibited in the American Museum of Natural History, "makes the animal much thicker dorsal-ventrally than it should be." His comments, however, are less convincing which concern the actual relations of this plate. We have known that its upper part fitted between the antero-dorso-lateral and the side of the cranium, we have not known, though, just how the plate was placed at the side of and below the suborbital, and the present specimen, in spite of its many virtues, does not appear to clear up this point. Dr. Branson's conclusion that "the inner arm of the clavicular must have come inside the clavicular and prevented the mandible from resting against it" is not quite evident, since it is based upon a "left clavicular (which) lies on the right side, on top of the right clavicular which has lost its lower end." For, unhappily, it is the lower end of this plate which concerns us, and we can not, therefore, feel sure that a plate which has become detached and shifted, will make clear its real relations to the plates near which it happens to lie. We may note in passing that several elements are present in the Oberlin specimen which, as far as we can judge from the picture, appear to have been earlier described, but never relatively in their natural positions; one of these is here shown close to the outer end of the interlateral plate, near a point where another plate should occur, by analogy with *Coccosteus,* but where no element is definitely known.

BASHFORD DEAN

[1] University of Missouri, Bulletin, Vol. 2, No. 2, October, 1911.

THE NUMBER OF STUDENTS TO A TEACHER IN STATE COLLEGES AND UNIVERSITIES

TO THE EDITOR OF SCIENCE: In the table published in your issue of October 27 the University of Minnesota was listed as having one teacher to every twenty-six students. The situation in this institution is by no means what it should be in this regard, but the ratio indicated above is so wide of the mark that I immediately looked up the figures upon which the estimate was based. A copy of the report to the Commissioner of Education is on file here. An examination of the report shows that in the total number of students all the students in the schools of agriculture, which are schools of secondary grade, were included. On the other hand the instructors in these schools were not included in the total of teachers. When this correction is made the ratio is changed from 1 to 26 to 1 to 16. As an average for all departments of the university this is probably approximately correct.

It seems desirable that some system of uniform and comparable statistics should be worked out. For example, there seems to be no definite understanding as to what constitutes a "teacher." Is a man giving himself wholly to research in a laboratory or in an observatory to be reckoned as a teacher? Is a clinical professor who gives part of his time to instruction in a school of medicine to be counted as a whole teacher, or such fraction of a teacher as is determined by the proportion of normal instruction which he offers?

The "students" need to be more carefully defined. Is the unit the individual without

reference to the length of his residence? Is the summer student at Columbia or Chicago, who may be in attendance for six weeks to be reckoned in the total on the same basis with students who are in residence for nine months? Until these things can be determined our statistics will have little value.

George E. Vincent

To the Editor of Science: In your issue of October 27 Mr. Handschin gives statistics from 81 state-supported schools, regarding the number of students to a teacher. These are based on the report of the U. S. Commissioner of Education. I fear that their main use is to illustrate the fact that such statistics often have very little value for purposes of comparing the several institutions.

The University of Wisconsin, for instance, is said to have 7.9 students per teacher, while the University of Michigan is given 15. No one can believe that if these institutions were compared on equal terms one would be found to have nearly twice as many students per teacher as the other. I do not know whether the statistics regarding Michigan are correct, or not, but the figure for Wisconsin conveys a wholly wrong impression. In the number of the Wisconsin faculty, as stated by the U. S. Commissioner of Education, are included the staff of the Agricultural Experiment Station, who do no teaching, and that of the Extension Division, whose students are not included in the catalogue. Thus the real number of students per teacher is greater than that indicated by the report.

The number of "student hours" in the College of Letters and Science has been recently computed. These are ascertained by multiplying the number of students reported in each course of study by the number of credits given for the course. If the sum of these products is divided by 15—the standard number of credits per semester—the result for 1910–11 shows a little over 3,000 "full time students" taught by the faculty of that college. If this number is divided by that of the faculty, the quotient shows 11.1 students per teacher. If the number of assistants in laboratories and elsewhere, who are employed for only partial service, is reduced to that of the full time instructors who would render the same amount of teaching, the number of students for each instructor is 13.3. In the college faculty are included the teachers and executive officers of the college, but not the executive officers of the university nor the staff of the gymnasium, library, etc.

An investigation made by President Van Hise before these statistics were compiled, and covering the whole university, shows about one teacher for 12 students—a result which is not widely different from that stated above for the college.

It is quite probable that if the number of students per teacher were determined in state universities of similar size on a basis which would yield comparable results, the figures would show no such wide differences as are found in Mr. Handschin's list.

E. A. Birge,
Dean

Madison, Wisconsin,
November 1, 1911

Since the tabulations on "The Number of Students to a Teacher in State Colleges and Universities" were published in Science, October 27, some communications have come to the writer complaining of the inaccuracy of the figures. The writer explained that inasmuch as he based his figures on data supplied to the U. S. Bureau of Education by the authorities of the schools themselves, he feels no responsibility in the matter. Evidently some schools have not been over-accurate in reporting their data.

However, this brings up the question of establishing common criteria as to who shall be counted a teacher. This matter has been brought to the attention of the U. S. Commissioner of Education with a petition that he establish some standard which might be incorporated in the blanks which are sent out to receive the data.

Who shall be counted a member of the instructional force? The following suggestions are offered: First, the tabulations should be

made under several heads, as, *e. g.*, professors, associate professors, assistant professors, resident lecturers (librarians and medical directors might be counted here), instructors, and student assistants.

But counting a person a full teacher merely because he teaches the average number of hours, gives no proper estimate of the strength of the school. The salaries paid, if taken in connection with the number of teachers, may well furnish such an index. Thus if six grades of instructors are tabulated as suggested above, and in addition, the sum-total of salaries paid for *instruction* is given, that should suffice to give an equitable rating, as well as to convey explicitly the information desired.

CHARLES HART HANDSCHIN

QUOTATIONS

THE PROPOSED REFORM OF THE CALENDAR

IN the issue of *Nature* for April 27 a concise account was given of the various proposals which have recently been put forward for the reform of the calendar. There is no reason to think that the subject has gained any serious general attention in England, if the fixing of Easter and the dependent festivals be regarded as a distinct question. But it has received a certain recognition in the discussions of some public bodies of an international character, such as the Congress of Chambers of Commerce; and the Swiss government has invited a conference for its formal consideration. In order to bring a definite scheme before the public a Calendar Reform Bill was presented to Parliament by Mr. Robert Pearce. The main features of the bill were briefly described in the article quoted. The first day of the year is called New Year Day, and is placed outside the reckoning of the week and the month. In leap years a day called Leap Day is intercalated between the end of June and the beginning of July, and is equally excluded from the week and the month. By this device there are left 364 days in every year, which are divided into four equal quarters of 91 days. Each quarter is subdivided into three months containing respectively 30, 30 and 31 days. Since 364 is exactly divisible by seven, the first of January always falls on the same day of the week, and the result of making this day Monday is to give 26 weekdays in every month, the four longer months containing five Sundays. Every calendar date corresponds to a particular day of the week (*e. g.*, Christmas Day always falls on a Monday), and the calendar is fixed, no longer changing as at present from year to year.

No doubt such a system possesses slight advantages from the point of view of simplicity over our present calendar. Apart from the objections which must be urged against any disturbance of conventions to which we have grown accustomed on anything less than adequate grounds, the great disadvantage attaches to the scheme that it interrupts the continuity of the weeks. The practical effect of this is seen where two or more calendars are in use side by side. Thus inconvenience must arise even now from the Jewish Sabbath falling on our Saturday. Under the provisions of the Calendar Reform Bill the case would be worse, for it would no longer hold a fixed place in the Christian week.

A second bill has now been presented to Parliament, this time by Sir Henry Dalziel. While differing from Mr. Pearce's bill, the new proposals contain nothing of importance which will be novel to readers of our previous article. For the bill merely embodies the suggestions made by Mr. John C. Robertson at the fourth International Congress of Chambers of Commerce held in London in June, 1910. The differences arise in the treatment of the four quarters of 91 days. These are divided into three months containing respectively 28, 28 and 35 days. Thus each month contains an exact number of weeks, and is made to begin with a Sunday. Incidentally, it is necessary to move Easter Sunday from April 14, as before proposed, to April 15. Also Christmas Day will fall automatically on a Wednesday instead of on a Monday. The advantage of the whole scheme is to obtain commensurability between the month and the week, but it is an advantage dearly bought at the sacrifice of even approximate equality between the

months. This necessitates special legal provision for payments in the case of monthly contracts to be made proportional to the length of the month concerned. Moreover, it requires legal definition for the duration of a "month" from any given date. Thus we understand that a month beginning on any day of the last week of a long month (containing 35 days) will close on the last day of the following month. At least, this is the interpretation which, after careful thought, we have placed upon the following interesting example of parliamentary draughtsmanship:

"8. In calculating monthly periods the following rule shall apply: In any period beginning in a long month and ending in a short month, the last day of the short month shall be held to be the corresponding day to any of the days in the last week of the long month."

If this interpretation be correct, a month may mean any period from 28 to 35 days in length. Surely the clause comes perilously near to a *reductio ad absurdum* to the whole scheme. We can imagine the following simple problem: "A domestic servant is engaged on March 32 at £22 a year. What is the amount of the first monthly payment, and when will it fall due?" We are utterly at a loss to solve the question, and suggest it for the consideration of the framers of the Fixed Calendar Bill.

The fundamental feature common to both the bills alluded to is the use of the *dies non*. Mr. Alexander Philip, who was responsible for reviving the idea of this fiction and advocating its practical convenience, appears to have become impressed with the extent of the opposition likely to be encountered before it can be adopted. Accordingly, in a paper before the section of Economic Science and Statistics, read at the recent meeting of the British Association, and in a pamphlet with which we have been favored, he seems to have abandoned those who are seeking to give legislative form to his ideas, and to advance a totally different suggestion. This requires that February shall gain two days, that July and October shall each lose one day, and that the extra day in leap year shall be placed at the end of June. Then in each quarter (now containing three calendar months) a period of twelve weeks (always beginning on a Sunday) can be found, two such successive periods being separated by a week. The idea is that public engagements can be more conveniently fixed by reference to the proposed twelve-week period, while the correspondence between this reckoning and the ordinary calendar can be very simply exhibited by a "perpetual adjustable" arrangement. But this practically means that we should have two calendars side by side, and no further criticism seems to be necessary.

It is fairly evident that the group of people who are bent on introducing a change in our present calendar are not agreed as to the precise form which that change should take. In the meantime it is probable that public opinion in this country is not ripe for any reform. It would welcome a fixed Easter, but it is more than likely that any radical alteration of the calendar would be resented. Since the reformers adhere to the yearly divisions of the Gregorian system, no scientific question is involved at any point, and the public convenience and public feeling are alone concerned with the issue.—H. C. P. in *Nature*.

SCIENTIFIC BOOKS

Methode der Ethnologie. By F. Graebner. Kulturgeschichtliche Bibliothek, Herausgegeben von W. Foy. Serie I., Ethnologische Bibliothek, Vol. I., Heidelberg, Carl Winter, 1911.

Mr. Graebner is one of the serious and broad-minded students who are not satisfied with an accumulation of facts, but who are carrying through their own investigations according to a well-considered plan, and who try to contribute to science in a certain well-defined line of research and look for results that have a definite bearing upon the whole field of their inquiries. In the present book Mr. Graebner gives us a statement of the method that he is following and which will interest all ethnologists. If, however, Mr. Graebner calls his method *the* method of ethnology, we can not agree with him. He must not expect that all ethnologists will limit the field of their researches in the way set forth

in these "Methods." It appears from Mr. Foy's, the editor's, preface, that in this respect his own views and Graebner's coincide; in fact, in outlining the program of the whole series, Mr. Foy excludes expressly "alle geschichtsphilosophischen und völkerpsychologischen Betrachtungen" (p. v). This exclusion of the psychological field seems to me to give to the whole "Method" a mechanical character, and to be the essential cause of differences of opinion between the author and myself which I shall briefly characterize in the following pages.

The book is divided into three chapters: critique of sources, interpretation of data and combination of data. I do not quite share Mr. Graebner's unfavorable view in regard to the lack of critique of all writers on ethnological subjects, and in regard to the feeling that we are confronted by an appalling lack of all method; a feeling that, according to the author, the historian experiences who takes up the study of ethnology. It is true that much that has been written is based on inadequate evidence, and that particularly the so-called "comparative" ethnologists do not weigh their evidence well. Spencer, Frazer and Westermarck, not to mention others, have been criticized again and again by experts from this point of view. However, the whole modern method of ethnology, at least as developed in the United States, is a continuous struggle for gaining a critical view-point in regard to data collected by earlier authors who did not understand the objects and problems of modern anthropology. We believe that a safe interpretation of the older observed data must be based on careful archeological, ethnological and somatological field work. While I see a perfectly sound tendency in these studies, sounder than Mr. Graebner believes it to be, I still recognize the usefulness of the first chapter in which the author expresses the experiences of the historian in a form interesting and important to the unexperienced ethnologist. On the whole, the training given nowadays to students in universities and museums will impress upon them the safeguards on which the author insists, and which are too often forgotten by the amateur.

Our interest centers in the following two chapters: Interpretation and Combination of Data. The fundamental difference of opinion between the author and myself appears in the chapter on Interpretation. He defines interpretation as the determination of the purpose, meaning and significance of ethnic phenomena (p. 55); but he does not devote a single word to the question, how these are to be discovered. He accepts, without any attempt at a methodical investigation, myths as interpretations of celestial phenomena (pp. 56, 57), as, for instance, the Jona theme as signifying the temporary disappearance of a heavenly body; a conclusion which I for one am not by any means ready to accept. At this place the complete omission of all psychological considerations makes itself keenly felt. The significance of an ethnic phenomenon is not by any means identical with its distribution in space and time, and with its more or less regular associations with other ethnic phenomena. Its historical source may perhaps be determined by geographic-historical considerations, but its gradual development and ethnic significance in a psychological sense, as it occurs in each area, must be studied by means of psychological investigations in which the different interpretations and attitudes of the people themselves toward the phenomenon present the principal material. In the case of mythology, by means of which Mr. Graebner exemplifies his considerations, I should demand first of all an investigation of the question: why, and in how far are tales explanatory or related to ritualistic forms? The very existence of these questions and the possibility of approaching them has been entirely overlooked by the author. On the whole, he seems to assume that the psychological interpretation is self-evident in most cases, but that by migrations and by dissemination combinations may be brought about which may lead to misinterpretations in so far as several groups that were originally distinct may be considered as one by origin (p. 64).

Related to this disregard of the psychological problem is Mr. Graebner's claim, that no objective criteria have been found that can prove relations other than those due to historical connection; that the evolutionary investigation can do no more than answer the question: "How can I best and with the least number of contradictions imagine the course of human development in accordance with my general, fundamental views?" (p. 82). Against this method he claims that transfer has been proved to exist everywhere, while the presence of parallel development can not be proved by objective criteria (p. 107). I think, we must say, that certain types of changes due to internal forces have been observed everywhere, and that, therefore, the question of similar or dissimilar evolution through internal forces does not rest on a more hypothetical basis than changes due to transmission.

Another fundamental difference of opinion between Graebner and myself relates to the phenomenon of "convergence," and here again the conclusions reached by the author seem to me due to a narrow, mechanical definition of the term "convergence." He ascribes this idea to Thilenius and Ehrenreich. I may, perhaps, point out that I have raised the essential point in an essay "The Limitations of the Comparative Method of Anthropology,"[1] and again in my essay "The Mind of Primitive Man."[2] Graebner's first error in regard to this phenomenon is one which he shares with almost all other students of anthropogeography. I quote from p. 94: "Gleichartige Erscheinungen können auch durch Angleichung ursprünglich verschiedener Erscheinungen unter dem Einfluss gleicher Natur- oder Kulturumgebung zustande kommen. Da eine spezifisch gleiche Kulturumgebung ausser durch Kulturverwandtschaft aber ihrerseits nur als durch gleiche Naturumgebung hervorgerufen denkbar ist, bleibt diese allein als primäre Ursache von Konvergenzen übrig." This presupposes an existence of a mankind without any individual differences, or an absolute identity of the psychical conditions that are affected by geographical environment. As soon as the psychic basis is distinct, even the most absolute identity of environment can not be assumed to lead to the same result. It is a curious view that is so often held, that when we speak of the influence of environment upon the human mind, only the environment need be considered. Is not in every problem of interaction the character of each of the interacting phenomena of equal importance? In the particular case here discussed we may say that our whole experience does not exhibit a single case in which two distinct tribal groups are so much alike in their mental characteristics that, when they are subjected to the same modifying causes, these mental differences could be disregarded, and it is an entirely hypothetical and improbable assumption that in earlier periods absolute mental uniformity ever existed in distinct groups.

The idea that in cases of independent origin of the same cultural phenomena identity of environment can give the only satisfactory explanation is deeply rooted in Mr. Graebner's mind, for he repeats, on p. 112: "Gleiche Kulturbedingungen bei selbständiger Entstehung können ihrerseits wieder nur auf die Naturbedingungen zurückgehen."

The phenomenon of convergence is next considered as non-existent for two reasons: a theoretical one and an empirical one. The former is based on the consideration that convergence can occur only under identical cultural conditions, and that, therefore, heterogeneous cultural conditions such as are found in cultures not genetically related, can not possibly lead to the same result. The empirical argument is based on a consideration of conditions found in Europe (pp. 113–114). A consideration of the same data leads me to results diametrically opposed to those observed by Graebner. The very fact that in modern civilization a new idea is frequently discovered independently by several individuals seems to me a proof of parallel lines of thought; and Mr. Graebner's statement that

[1] Science, N. S., Vol. IV., pp. 901–8, 1896.

[2] *Journal of American Folk-Lore*, Vol. XIV., pp. 1–11, 1901.

the thought of only one man becomes socially active, *i. e.*, is adopted, seems to me to demonstrate just the reverse from what he claims. For an idea expressed at a time that is not ready for it remains barren of results; pronounced at a period when many think on similar, convergent lines, it is fruitful and may revolutionize human thought. May I point out that Graebner's own book may be taken as an example of this tendency? For it expresses the same fundamental idea that is so potent at present in all lines of biological research, that of the permanence of unit characters. An idea may become effective whenever the ethnic conditions are favorable to its adoption and development, no matter what the historical origin of the present general status may have been.

The questions of independent origin and convergence can not be entirely separated, and some of the previous remarks may perhaps rather relate to the probability of independent origin which Graebner practically denies. One aspect of the theory of convergence relates more specifically to the question whether two ethnic groups that are genetically distinct, which are confronted by the same problem, will solve it in a similar manner. The theory of convergence claims that similar ways *may* (not *must*) be found. This would be a truism, if there existed only one way of solving this problem, and convergence is obviously the more probable the fewer the possible solutions of the problem. This, however, is not what we ordinarily understand under convergence. Ethnic phenomena are, on the whole, exceedingly complex, and apparently similar ones may embrace quite distinct complexes of ideas and may be due to distinct causes. To take a definite example: Taboos may be arbitrarily forbidden actions; they may be actions that are not performed because they are not customary, or those that are not performed because associated with religious or other concepts. Thus a trail may be forbidden because the owner does not allow trespassing, or it may have a sacred character, or it may be feared. All ethnic units, separated from their cultural setting, are artificial units, and we always omit in our comparisons certain groups of distinctive characteristics—no matter whether the comparisons are made from the point of view of cultural transmission, or of evolutionary series. Thus, in our case, the forbidden action stands out clearly as a unit, that of the taboo, although its psychological sources are entirely distinct—and this is one of the essential features of convergence. Nobody claims that convergence means an absolute identity of phenomena derived from heterogeneous sources; but we think we have ample proof to show that the most diverse ethnic phenomena, when subject to similar psychical conditions, or when referring to similar activities, will give similar results (not equal results), which we group naturally under the same category when viewed not from a historical standpoint, but from that of psychology, technology or other similar standpoints. The problem of convergence lies in the correct interpretation of the significance of ethnic phenomena that are apparently identical, but in many respects distinct; and also in the tendency of distinct phenomena to become psychologically similar, due to the shifting of some of their concomitant elements—as when the reason for a taboo shifts from the ground of religious avoidance to that of mere custom.

In the foregoing remarks I have tried to show why Mr. Graebner's negative critique of parallelism and convergence does not seem to me conclusive. Just as little convincing appear to me the arguments on which he bases his method of determining cultural relationships. Here, also, the fundamental error seems to me based on the complete disregard of mental phenomena. Mr. Graebner lays down the following methodological principle: "Two or more phenomena are comparable, and the one may be used to interpret the other, if it can be shown that they belong, if not to the same local cultural complex, at least to the same cultural group" (p. 64). It seems to me an entirely arbitrary hypothesis to assume *a priori* the homogeneity of similar phenomena belonging to the same cultural group. Mr. Graebner explains his standpoint by the example of the discussion of agricul-

tural rites in Frazer's "Golden Bough," and accepts the discussion on account of the homogeneity of the cultural groups of Europe and western Asia, from which the examples have been taken. This part of Frazer's deductions seems to me just as unmethodical as the others which are based on examples taken from a wider series of cultural groups. The concepts of comparability and homogeneity, as I understand them, have to deal not only with historical relationship, but to a much higher degree with psychological similarity, for only as elements of the mental makeup of society do ideas or actions become potent and determining elements of further development. To give an instance of what I mean: If the aged are killed by one people for economic reasons, by another to insure them a happy future life, then the two customs are not comparable, even if they should have their origin in the same historical sources. Graebner's idea appears clearly in the following statement: "If in different parts of the earth peoples are found that are closely related in their ways of thinking and feeling, evidently the same question arises, that has been treated before in regard to cultural forms, viz., whether these similarities are not based on community of descent or on early cultural contact" (p. 112). Such a view can be maintained only if we disregard the action of inner forces, that may lead two people of like cultural possessions after their separation to entirely distinct conditions. In short it is based on the view of a very limited action of internal forces.

Through the restriction of comparability and interpretation exclusively to the phenomena of transmission and original unity—a definition that I do not find given, but that is everywhere implied—and by the hypothesis, that ethnic phenomena that occur in two areas due to transmission or to original unity will always remain comparable and can be mutually interpreted, the author is necessarily led to his conclusions, which are merely a restatement of his incomplete definitions and of his hypothesis; for, if we call comparable exclusively phenomena that are historically related, naturally then there can be no other kind of comparability, and psychological ethnology does not exist.

Exactly the same criticism must be made against the sense in which the term "causal connection" is used. Here also the psychological connections are intentionally excluded, because the psychological argument, its method and validity, are not congenial to the author; and "causal connection" is simply identified with historical connection. On this basis only can I understand the statement that in literary tradition causal relations are directly given (p. 73). This is not meant to refer to modern historical science, but to the literary sources of Asia and Europe. Is not literary tradition on the whole proof of the misunderstanding of causal relations, rather than the reverse—provided we understand under causal nexus not the simple mechanical aspect of transmission, but the complex social conditions that admit transmission and that bring about internal changes.

A correlate of the assumption that ethnic elements that are genetically related remain always comparable plays a most important part in Mr. Graebner's method of proving cultural relations: "Whenever a phenomenon appears as an inorganic element in its ethnic surroundings, its presence is due to transmission." This might be true if primitive cultures were homogeneous units; which, however, is not the case. The more we learn of primitive culture, the clearer it becomes that not only is the participation of each individual in the culture of his tribe of an individual character, or determined by the social grouping of the tribe, but that also in the same mind the most heterogeneous complexes of habits, thoughts and actions may lie side by side, without ever coming into conflict. The opinion expressed by Mr. Graebner seems to me so little true, that I rather incline toward the reverse opinion. It seems at least plausible, although it has never been proved, that on the whole only such ethnic features are transmitted that in some way conform to the character of some feature of the life of the people that adopt them. The criterion in question seems to me, therefore, not accept-

able, until it can be sustained by observed facts.

This idea is probably related to the author's conception of the transmission of cultural elements in the form of complexes. He says: "A migration of single cultural elements, also of tales, over wide distances, without the spread of other cultural possessions at the same time, may be designated without hesitation as a 'Kulturgeschichtliches Nonsens'" (p. 116). I should like to see the proof of this daring proposition. It is, of course, not the question whether one cultural group owes much or little to another one, but whether cultural elements are necessarily transmitted in groups. To take only a few examples. Is not the gradual introduction of cultivated plants and domesticated animals a case in kind? Does not the irregular distribution of tales show that they are carried from tribe to tribe without relation to other transmissions? It seems to me that the more the problem of cultural contact is studied, the more amazing becomes the independence of far-reaching influences in one respect, from the spread of other cultural possessions. The example of language used by Mr. Graebner (p. 111) presents facts entirely different from those which he imagines. Thus we find phonetic influences without corresponding lexical or morphological influences and *vice versa*. The serious defect of the "Method" is here clearly seen. Instead of operating with the purely mechanical concepts of transmission and conservatism relating to the most ancient types of culture, we must investigate the innumerable cases of transmission that happen under our very eyes and try to understand how transmission is brought about and what are the conditions that favor the grouping of certain new elements of an older culture.

I think I have shown that not only the psychological and evolutionary standpoint contain hypothetical elements that must be subject to a rigid criticism, but that the restriction of all ethnic happenings to mechanical transmission or preservation contains many hypotheses the validity of which is open to most serious doubt. Mr. Graebner has failed in his attempt, because he does not apply the same rigorous standard to his own favorite views, that he applies so successfully to a discussion of the evolutionary theory (pp. 77 et seq.). Here he is at his best, and his criticism of the many hypothetical assumptions contained in all theories of the evolution of culture are well taken and should be read and minded by all students of ethnology. In a few cases, particularly in the discussion of correlated ethnic phenomena, he does not seem to do quite justice to the force of the argument, because he prefers a spacial interpretation of these correlations to a sequential one; but both are certainly equally possible and probable.

It is, however, curious to note that, notwithstanding his uncompromising negative position, the author tacitly re-introduces some of the most fundamental concepts of cultural evolution. Thus he speaks on p. 63 of the "well-known tendency of degeneration and disintegration, according to which myths become legends and fairy-tales, significant institutions formal traits"; and again on p. 152: "Undoubtedly sound points of view are, that the beginnings of every phenomenon must be simple and in a way naturally grow, and that the development must be intelligible by the most simple psychological process." My criticism of these assumptions would be much more far reaching than that of Mr. Graebner.

Thus it seems to me that the methods of Mr. Graebner are subject to the same strictures as those of the other schools, and the "Ferninterpretation," "Kulturkreise" and "Kulturschichten" must be considered as no less hypothetical than the "Stufenbau" of Breysig or the sequences of Lamprecht.

In the development of science it is, however, useful to carry through a hypothesis to its limits and to investigate the ultimate conclusions to which it will lead. From this point of view pages 104–151, in which the principle of conservatism and transmission are strained to the utmost with an absolute disregard of all other possibilities, will be helpful for a gradual clearing of our views. Perhaps even more helpful is the actual application that Mr.

Graebner has made of these principles in his chosen field of Melanesia in its relations to the whole rest of the world.

My own opinions in regard to the value of a single evolutionary series, the importance of very old cultural elements that survive in many parts of the world, and the occurrence of transmission over enormous areas coincide to a great extent with those of Mr. Graebner. I also hold the opinion that the discovery of a really new idea is much more difficult than is generally admitted, and therefore a manifold spontaneous origin quite unlikely. Nevertheless, I can not acknowledge that he has given us *any* safe criterion that would enable us to tell that in any given case transmission can be definitely proved against independent origin, and I am just as skeptical as before reading his book in regard to the advisability of accepting Ratzel's "Ferninterpretation." I rather repeat once more the warning that I have given again and again for twenty years: to be rather overcautious in admitting transmission as the cause of analogies in cases of the sporadic occurrence of similar phenomena, than to operate with the concept of lost links of a chain of cultural intercourse.

That through the exaggerated application of a single principle, when several must be admitted as acting, new viewpoints may be discovered—that much I willingly admit, and I enjoy to follow the daring generalizations to which Mr. Graebner is led. I may, however, be pardoned if I can not accept this as the method of ethnology. I see safe progress essentially in the patient unravelling of the mental processes that may be observed among primitive and civilized peoples, and that express the actual conditions under which cultural forms develop. When we begin to know these, we shall also be able to proceed gradually to the more difficult problems of the cultural relations between isolated areas that exhibit peculiar similarities.

Franz Boas

México, D. F.

Phytogeographic Survey of North America. By John W. Harshberger. Being Vol. XIII. of Engler and Drude's "Die Vegetation der Erde." Leipzig, Wilhelm Engelmann. 8vo. Pp. 790, with 1 map, 18 plates and 32 text figures. 1911. 52 M.

The series of monographs issued by Professors Engler and Drude under the title of "Die Vegetation der Erde" reaches the thirteenth number in the stately volume before us. Among preceding volumes are Radde's "Pflanzenverbreitung in der Kaukasusländer," Drude's "Hercynische Florenbezirk," Diels's "Pflanzenwelt von West-Australien," Engler's "Pflanzenwelt Afrikas," etc., all of which have been received with favor by botanists the world over and this prejudices us in favor of this one from the hand of Professor Harshberger.

Unlike the preceding this volume is given in English, which indeed was quite proper in view of its American authorship, and the additional fact that it will be much more available to ordinary students and readers. And it may be said here that I know of no book on scientific botany which is more likely to be read by non-botanical readers than this one. As one reads it he is constantly impressed with the importance to a great number of men of just such knowledge as is brought out here. One wishes it were possible to give as clear pictures to the intelligent layman as are here given to the systematic botanist.

The plan of the work may be stated as follows:

After an English explanatory preface by the author, and a short German summary by Dr. Drude, the book is divided into four great parts, the first of which (92 pp.) is historical and bibliographical. This is followed by Part Second (of 77 pp.) which is devoted to geographic, climatic and statistical considerations. Part Third takes up (in 175 pp.) the geological evolution of the North American continent and its flora, while Part Four (of 358 pp.), which is the body of the book, takes up the phytogeographic regions, formations and associations. The whole is followed by a voluminous Index of Plants (of 85 pp.) which includes helpful synonyms.

Part Four, which, as has just been said, is the body of the work, includes seven chapters. An analysis of these will be helpful as giving some idea of the logical treatment of the subject. The first chapter deals with Arctic and Sub-arctic zones: the second takes up the Atlantic section of the North Temperate zone, with three subdivisions, viz., the Saint Lawrence-Great Lakes Region; the Atlantic-Gulf Coastal Region, and the Piedmont-Appalachian-Ozark Plateau-Mountain Region. Chapter III. is devoted to the Xerophytic Section of the Interior in the North Temperate Zone, with its three subdivisions—the Prairie Region, Rocky Mountain Region and Great Basin Region. The fourth chapter relates to the Pacific Section of the North Temperate Zone, including the Sitka Region, Columbian Region and Californian Region. The fifth chapter takes up the Mexican Subtropical Zone and Mountain Regions. The sixth and seventh chapters are devoted to the North American Tropic Zone, the former to the Mexican and Central American Sections and the latter to the West Indian Section.

The author's purpose which he kept before him as he wrote this book is well expressed in a paragraph of his preface. "But with the settlement of the continent and the exploitation of its resources, such as the drainage of its swamps, the removal of the original forests, and the construction of irrigation works in arid districts, the original condition of the land surface and its vegetation will be changed forever. It is important, therefore, for this generation of botanists and scientists to leave in printed form, in photographs, in maps and in other illustrations a record of the original appearance of the country before the march of civilization has destroyed primitive conditions. This from the standpoint of the botanist is an important matter, because all future botanic and forestry work must be based on considerations of what was the character of the native growth."

With this object in view the author set himself about the task of writing a book which should give the reader a clear picture of the essential features of the original vegetation of North America. It would be quite impossible to give many details in a work covering so large and varied a field, and this the author has not attempted. So when the reader finds his own particular region treated, as he thinks, somewhat too scantily he must remember that this is necessarily the case, and that if the successive pictures contained too much of detail they would lose much in distinctness and sharpness of outline. As one runs over the paragraphs they appear like pen pictures, whose bold outlines leave a series of vivid impressions on the reader's mind, and this is what the author hoped to accomplish. The author has tried to make such a record as would enable future botanists to know what was the character of the original vegetation of North America.

That the book contains errors of fact, and errors of interpretation probably no one will be more ready to acknowledge than its author, for it could scarcely be otherwise with so large a field as the whole of North America, and a department of botany so new as that of ecological phytogeography. The unpleasant task of pointing out the individual errors I willingly leave for others to accomplish. There is so much in the book that is above criticism that one may well settle down to the enjoyment of its reading, as one enjoys a great landscape painting, with the certainty that the general effect is well worth getting, even though some of the hills are too high and too sharp in the painting, and the names and distribution of some of the plants are given erroneously in the book. The great outlines are true, nevertheless.

It remains for me to speak of the fine plates, which are reproductions from well-selected photographs, and the text figures, many of which are similar but smaller "half tones" of photographs. The map of North America showing phytogeographic areas will prove to be most helpful. Nor must reference be omitted to the interesting history of floristic work in the different geographic areas of North America, where the student will find the names of most of the botanists who have had to do with the exploration of the country.

The bibliography, while necessarily only partial, will be very helpful to the student of North American phytogeography.

Charles E. Bessey
The University of Nebraska

TICK (IXODOIDEA) GENERIC NAMES TO BE INCLUDED IN THE "OFFICIAL LIST OF ZOOLOGICAL NAMES"

1. The international committee invited by the secretary of the International Commission on Zoological Nomenclature to make a detailed study of the nomenclature of ticks (Ixodoidea) and consisting of the following specialists in this group, W. Dönitz (Berlin), Albert Hassall (Washington), L. G. Neumann (Toulouse), G. H. F. Nuttall (Cambridge) and Cecil Warburton (London), has submitted its first report.

2. Said committee unanimously agrees that the following eight generic names are the correct names for the genera in question, and that the correct genotypes, according to the International Rules of Zoological Nomenclature, are the species cited:

Amblyomma Koch, 1844*a*, 223–231, type *cajennense* Fabricius, 1787.

Argas Latreille, 1796*a*, 178, type *reflexus* Fabricius, 1794.

Dermacentor Koch, 1844*a*, 235–237, type *reticulatus* Fabricius, 1794.

Hæmaphysalis Koch, 1844*a*, 237, type *concinna* Koch.

Hyalomma Koch, 1844*a*, 220–223, type *ægyptium* Linnæus.

Ixodes Latreille, 1796*a*, 179, type *ricinus* Linnæus.

Rhipicentor Nuttall & Warburton, 1908, 398, type *bicornis* Nuttall & Warburton.

Rhipicephalus Koch, 1844*a*, 238, 239, type *sanguineus* Latreille.

3. Notice is hereby given that the undersigned will wait until July 1, 1912, for any zoologist to raise any objection to any part of the report of the special committee. If no valid point is raised by the date mentioned, the undersigned will transmit the list to the International Commission with the motion that these names be incorporated in the "Official List of Zoological Names," provided for by the last International Zoological Congress.

All correspondence on this subject should be directed to

C. W. Stiles,
Secretary International Commission on Zoological Nomenclature
Hygienic Laboratory,
Washington, D. C.,
October 30, 1911

THE NATIONAL ACADEMY OF SCIENCES

At the meeting of the National Academy of Sciences held in the Public Library, New York City, on November 21 and 22, the program of scientific papers was as follows:

Flexner, Simon: Mode of Infection in Infantile Paralysis.

Loeb, Jacques: Oxidations in the Cell.

Carrel, Alexis (Introduced by Simon Flexner): Manifest and Non-manifest Life of the Tissues.

Conklin, E. G.: Cell-size and Nuclear-size.

Harrison, R. G. (Introduced by E. B. Wilson): Protoplasmic Movement in Embryonic Cells.

Kükenthal, Willy (Introduced by E. L. Mark): The Biological Significance of the so-called Hairs of the Hairy Frog, *Astylosternus robustus* (Blgr.).

Morgan, T. H.: Sex-limited Inheritance.

Davenport, C. B. (Introduced by T. H. Morgan): Recent Advances in the Study of Eugenics.

Osborn, Henry F.: The Problem of Continuity or Discontinuity in the Origin of Unit Characters in Heredity.

Hrdlička, Aleš (Introduced by W. H. Holmes): Ancient Man in South America in the Light of Recent Researches.

Trelease, Wm.: The Leafy Mistletoes of North America.

Grabau, A. W. (Introduced by J. F. Kemp): A Comparison of the Basal Paleozoic in Northwestern Europe and Eastern North America.

Kemp, J. F.: New Data on the Bed-rock Channel of the Hudson River.

Kemp, J. F.: The Source of the Saratoga Mineral Springs.

Smith, Alexander (Introduced by Charles F. Chandler): Recent Experiments on the Effect of the Absence of Moisture upon the Chemical Dissociation of Calomel and other Salts.

Boltwood, B. B.: Proposed International Radium Standard.

Pupin, M. I.: Conductors Rotating in Alternating Magnetic Field.

Osborne, T. B., and Mendel, Lafayette B. (Introduced by T. B. Osborne): The Rôle of Different Proteins in Nutrition and Growth.

Peirce, C. S.: A Method of Computation.

Peirce, C. S.: The Reasons of Reasoning, or Grounds of Inferring.

Walcott, Charles D.: Biographical Memoir of Samuel Pierpont Langley.

Becker, George F.: The Remainders of Certain Mechanical Quadratures.

Wells, H. L.: A Color-effect in Isomorphous Crystallization.